

New as of:

07.2015

HELIODENT^{PLUS}

Installation Instructions

English

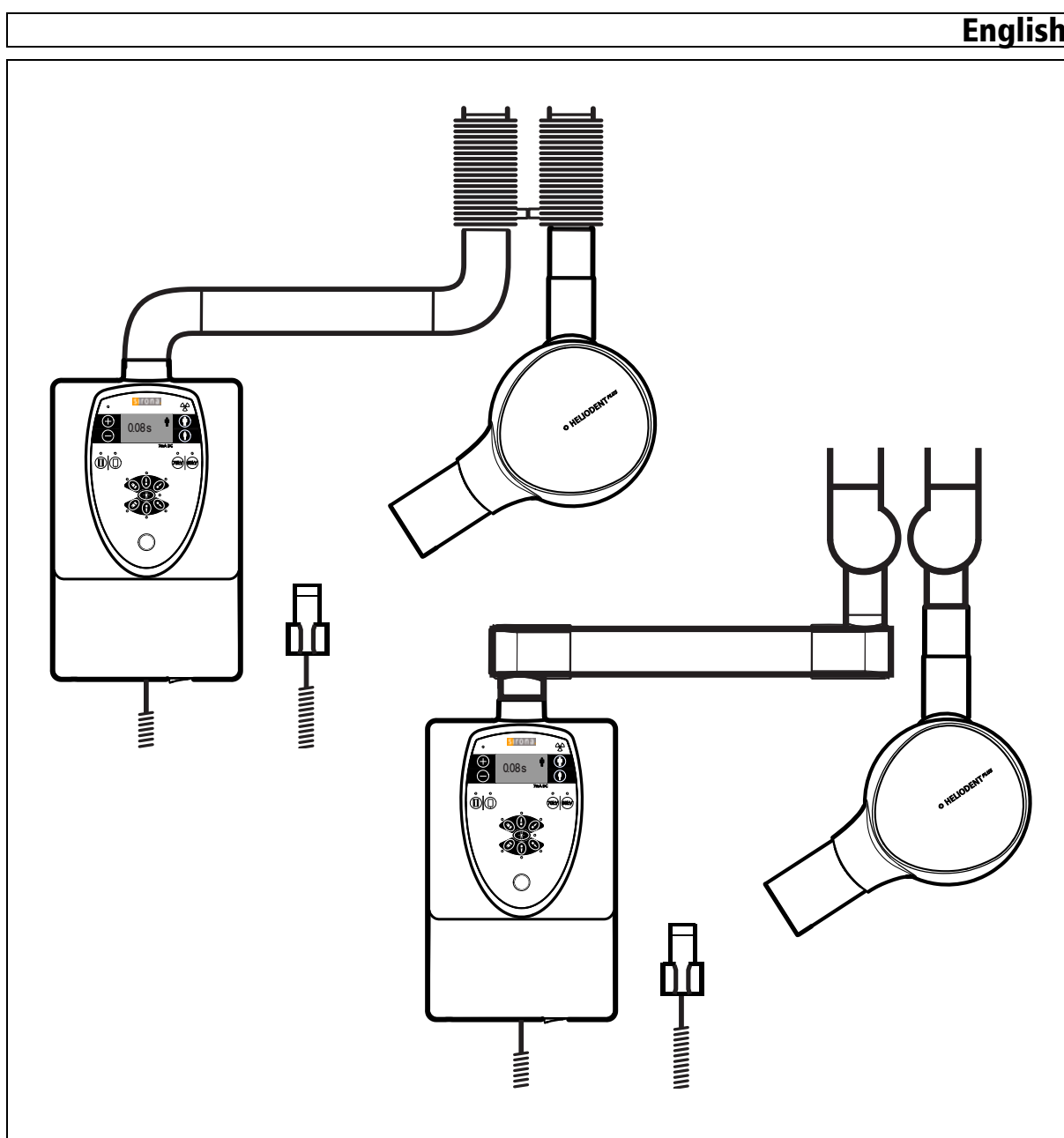


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1 About these Installation Instructions

1.1 Scope

These Installation Instructions describe the installation of the HELIODENT^{PLUS} extraoral X-ray system. They are intended for use exclusively by trained and authorized distributors and service technicians.

1.2 Round and angular support arm system

The HELIODENT Plus is available with a round and angular support arm system.

In the images which do not exclusively demonstrate the angular support arm system, the round support arm system is shown.

1.3 Other documentation required

In addition to these installation instructions you will require the following documentation:

Drilling template

- HELIODENT^{PLUS} drilling template: Order No. 62 15 003

Wiring diagrams

- HELIODENT^{PLUS} Wiring References: Order No. 62 15 086

Service Manual

- HELIODENT^{PLUS} Service Manual: Order No. 62 15 102

1.4 Structure of the document

1.4.1 Identification of danger levels

To prevent personal injury and material damage, please observe the warning and safety information provided in this document. Such information is highlighted as follows:



DANGER

An imminent danger that could result in serious bodily injury or death.



WARNING

A possibly dangerous situation that could result in serious bodily injury or death.



CAUTION

A possibly dangerous situation that could result in slight bodily injury.

NOTICE

A possibly harmful situation which could lead to damage of the product or an object in its environment.

IMPORTANT

Application instructions and other important information.

Tip: Information on making work easier.

1.4.2 Formats and symbols used

The formats and symbols used in this document have the following meaning:

✓ Prerequisite 1. First action step 2. Second action step - or ➤ Alternative action ↩ Result ➤ Individual action step	Prompts you to do something.
see "Formats and symbols used [→ 7]"	Identifies a reference to another text passage and specifies its page number.
• List	Designates a list.
"Command/menu item"	Indicates commands, menu items or quotations.

2 General safety information

DANGER

Potentially lethal shock hazard:

- It is essential that you switch the line voltage OFF at the main switch of the building installation before beginning installation of the unit!

DANGER

Potentially lethal shock hazard!

Fixed connection!

Installing a mains plug instead of the specified fixed connection infringes international medical regulatory actions and is prohibited. In case of error, this puts patients, users, and other parties seriously at risk.

WARNING

Radiation protection

The valid radiation protection regulations and measures must be observed. The statutory radiation protection equipment must be used.

In case of malfunctions, cancel the exposure immediately by letting go of the exposure release button.

CAUTION

Risk of injury!

- The installation must be carried out in accordance with the requirements stated in our Installation Instructions.
- Installation may be carried out only by personnel specifically authorized by SIRONA.

CAUTION

Electromagnetic compatibility:

- ✓ The unit should not be operated in the immediate vicinity of other devices (see also "Installation Requirements, Chapter on EMC").
- If this proves to be unavoidable, the unit should be monitored to ensure that it is operating properly.

CAUTION

Electrical components of the unit can be destroyed.

Prior to opening the unit

- Please comply with the usual precautionary measures for handling printed circuit boards (ESD).
- Make sure you touch a ground point to discharge yourself prior to touching the components.
- Use an ESD wrist band and connect it to the protective ground wire.

3 Installation options

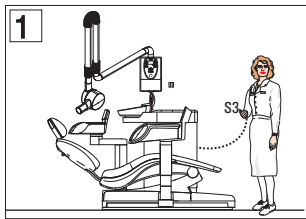
Designations for release buttons and door contact

- Manual release **S3**
 - Coiled cable
- Release key on the control membrane **S4**
 - Directly connected to control board DX4
- Remote control release key **S9**
 - Integrated in remote control housing
- Door contact (safety circuit) **S7**

Installation option 1

Release in the treatment room **without** remote control

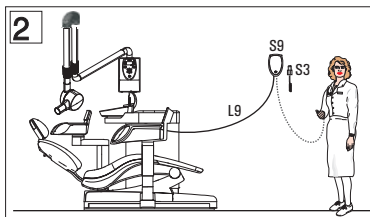
- Release
 - Manual release **S3**



Installation option 2

Release in the treatment room **with** remote control

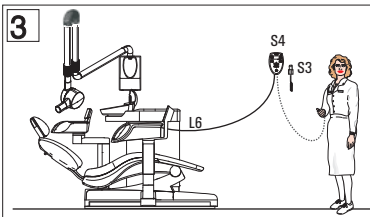
- Release
 - Manual release **S3**
 - or
 - Remote control release key **S9**



Installation option 3

Release in the treatment room **with** Remote Timer

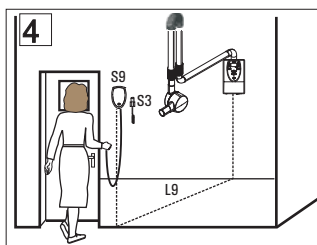
- Release
 - Manual release **S3**
 - or
 - Release key on the control membrane **S4**



NOTICE

Length of cable supplied for Remote Timer approx. 10 meters (394")
(must not be extended).

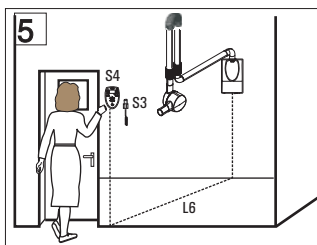
Conduit int. dia. at least 12 mm (1/2").

**Installation option 4**Release outside of the X-ray room **with** remote control

- Release
 - Manual release **S3**
 - or
 - Remote control release key **S9**

NOTICE**Installation prerequisites**

Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.

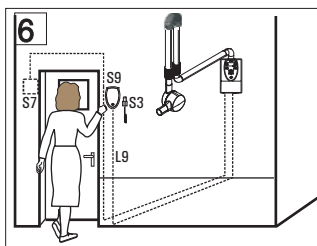
**Installation option 5**Release outside of the X-ray room **with** Remote Timer

- Release
 - Manual release **S3**
 - or
 - Release key on the control membrane **S4**

NOTICE

Length of cable supplied for Remote Timer approx. 10 meters (394") (must not be extended).

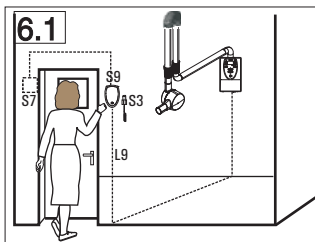
Conduit int. dia. at least 12 mm (1/2").

**Installation option 6**Release outside of the X-ray room **with** remote control, door contact safety circuit

- Door contact
 - Door contact **S7** wired to the wall adapter
- Release
 - Manual release **S3**
 - or
 - Remote control release key **S9**

NOTICE**Installation requirement**

Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.



Installation option 6.1

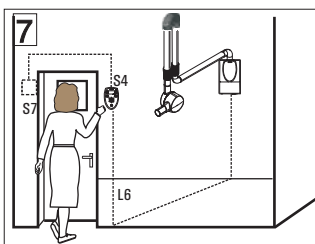
Release outside of the X-ray room **with** remote control, door contact safety circuit

- Door contact
 - Door contact **S7** wired to the remote control housing
- Release
 - Manual release **S3**
 - or
 - Remote control release key **S9**

NOTICE

Installation requirement

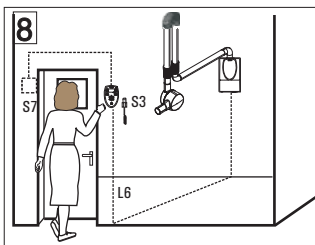
Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.



Installation option 7

Release outside of the X-ray room **with** Remote Timer, door contact safety circuit

- Door contact
 - Door contact **S7**
- Release
 - Release key on the control membrane **S4**



Installation option 8

Release outside of the X-ray room **with** Remote Timer, door contact safety circuit

- Door contact
 - Door contact **S7** wired to Remote Timer
- Release
 - Manual release **S3**

4 Checking the delivery

All products from Sirona are carefully checked prior to shipment. Please perform an incoming inspection immediately after delivery.

1. Check the delivery note to ensure that the consignment is complete.
2. Check whether the product shows any visible signs of damage.

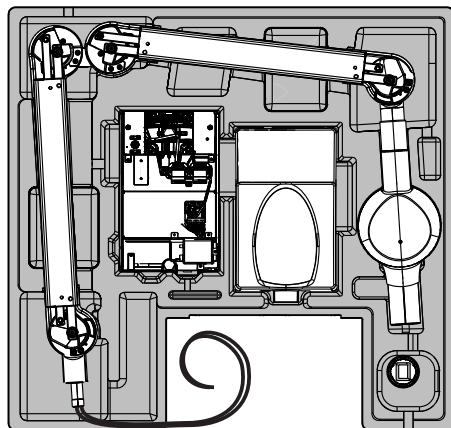
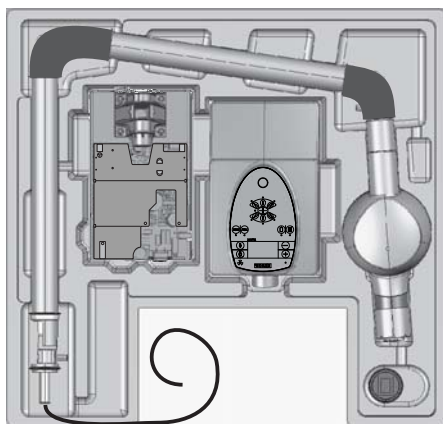
NOTICE

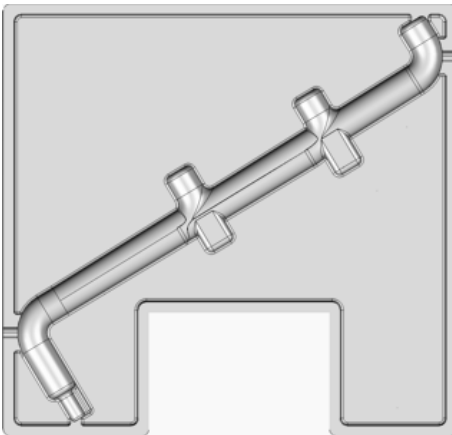
Damage during transport

If the product was damaged during transport, please contact your carrying agent.

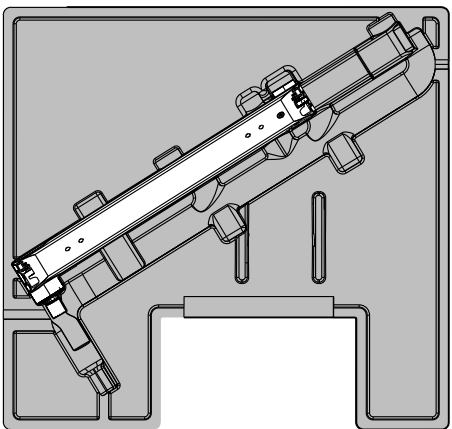
If return shipment is required, please use the original packaging for shipment.

HELIODENT^{Plus} Packaging, bottom part





HELIODENT^{PLUS} Packaging, top part



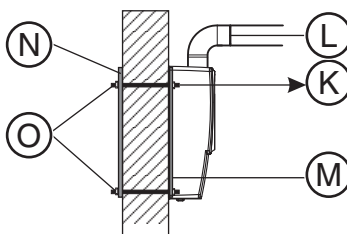
5 Required materials

5.1 Required installation material

CAUTION

Observe wall properties

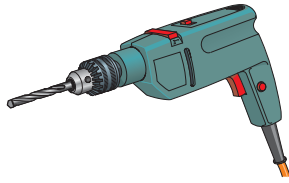
In installation situations, the technician is responsible for the assessment of wall properties and selecting the method of attaching the unit to the wall.



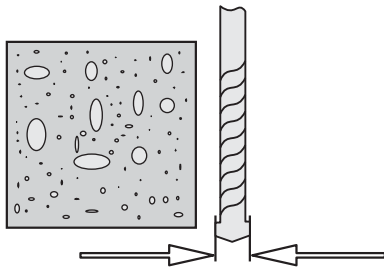
K	Tensile force per screw 3600 N (800 lbf) if $L \leq 700\text{ mm}$ (27 1/2") 4200 N (950 lbf) if $L \leq 950\text{ mm}$ (37 3/8")
L	Length of support arm
M	Mounting plate (supplied)
N	Anchor plate
O	Threaded bolt M8

- The permissible tensile force of the selected attachment must at least equal the tensile force listed above.
- Matching wood screws for wooden beams are included in delivery.
- For all other wall structures, special wall anchors must be purchased from a selected dealer. The wall anchors and screws should be identical for every attachment point.
- Alternatively, an anchor plate can be used as a counter bearing. In this case, M8 threaded rods of the appropriate length for the wall (thickness of the wall + 2 x mounting plate thickness + attachment material) are required.

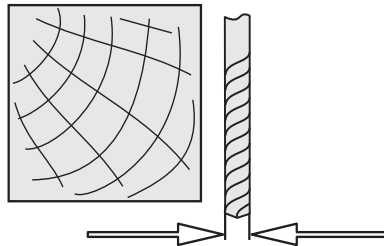
5.2 Required tools and auxiliary materials



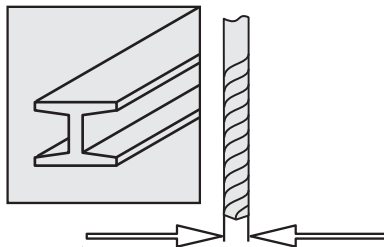
- Suitable drill and/or suitable hammer drill



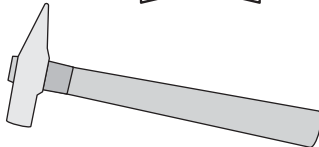
- Masonry drill bit 10 mm (3/8")
- Masonry drill bit 6 mm (1/4")



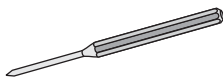
- Wood drill bit 6 mm (1/4")



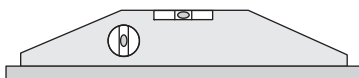
- Metal drill bit 4.3 mm (3/16")



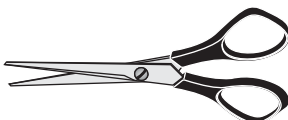
- Hammer



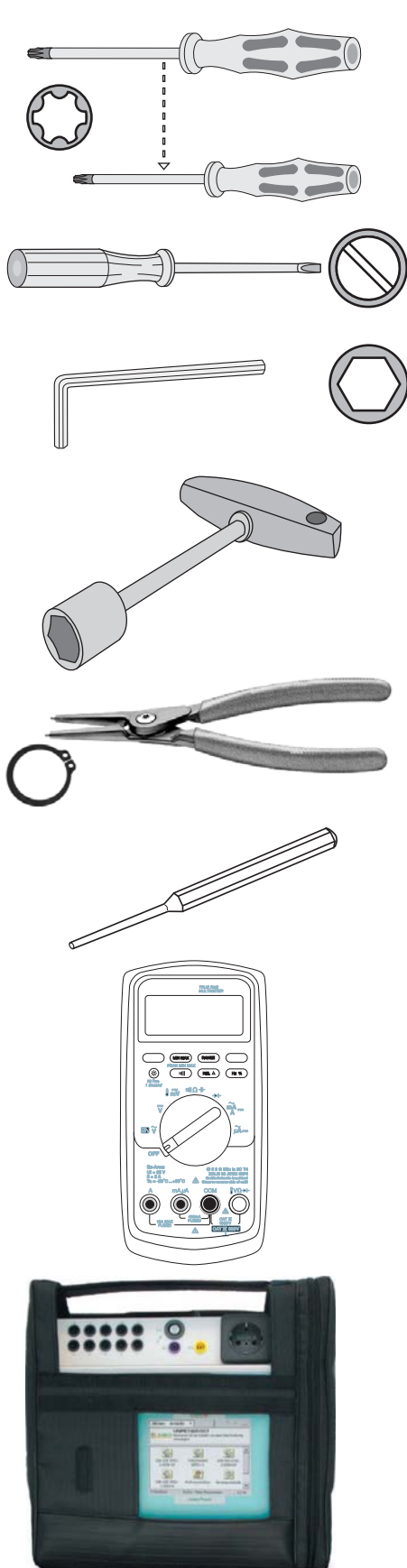
- Center punch



- Spirit level



- Scissors



- Screwdriver, Torx[®], sizes T10, T15 and T20
- Slotted screwdriver, sizes 2.5mm and 3.5 mm (3/32" and 9/64")
- Allen wrench size 13mm, 4mm
- Socket wrench or ratchet wrench (with extension), size 13 mm
- Retaining ring pliers for outside rings (shafts)
- Drift punch
- Multimeter or ammeter (battery-operated)
- Test unit for device leakage current measurement, e.g. Bender tester or line-frequency, high-resistance measurement voltage source (isolation transformer) and measuring circuit (MD) that meets the requirements of IEC 60 601-1.
- **Power source for protective ground wire test**
Technical data:
 - No-load voltage **max.** 6V
 - Short-circuit current **at least** 5A - **max.** 25A

6 Installation

6.1 Installing the wall adapter

For HELIODENT^{PLUS} on the mobile stand, see Installing the mobile stand [→ 89]

6.1.1 Preparation

Attachment points

These installation instructions distinguish between wall-mounted installation (masonry) and installation on wooden beams.

- **Wall-mounted installation:** 3 attachment points
 - Positions **A1**, **A3** and **A4**
- **Wooden beam installation:** 2 attachment points
 - Positions **A2** and **A4**

NOTICE

Covering up old installation sites

Possibilities for using or covering up the installation sites of old units are described in the section "Replacing old units" [→ 83].

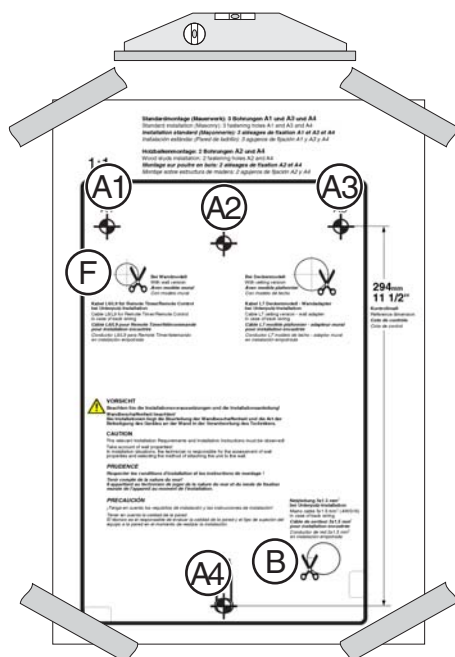
Getting started



DANGER

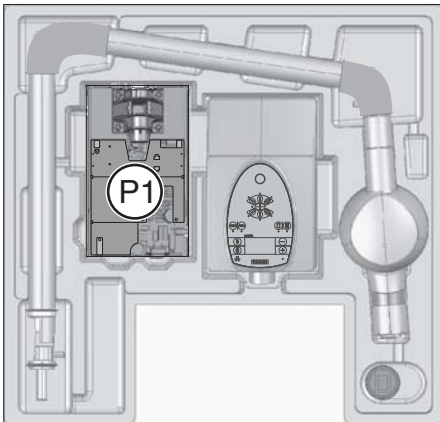
Shock hazard!

Be sure to switch off the line power supply before connecting the line voltage!



1. **For concealed installation only:** Cut out cable bushings (B) and (F) in the drilling template.
2. Pull the cable through the cable bushings (B) and (F).
3. Align the drilling template using a spirit level and attach it to the wall.
4. Center punch the fastening points and drill according to the type of fastening used.
 - When securing with an anchor plate, drill into wall with a $\varnothing$ 8 mm drill bit.
 - If installing with wall plugs, drill according to the wall plugs used (max. $\varnothing$ 10 mm) and insert the wall plugs.
 - In case of a wooden wall, drill holes at least 80 mm deep with a $\varnothing$ 6 mm wood drill bit.
5. Remove the drilling template.

6.1.2 Installation (concealed installation)



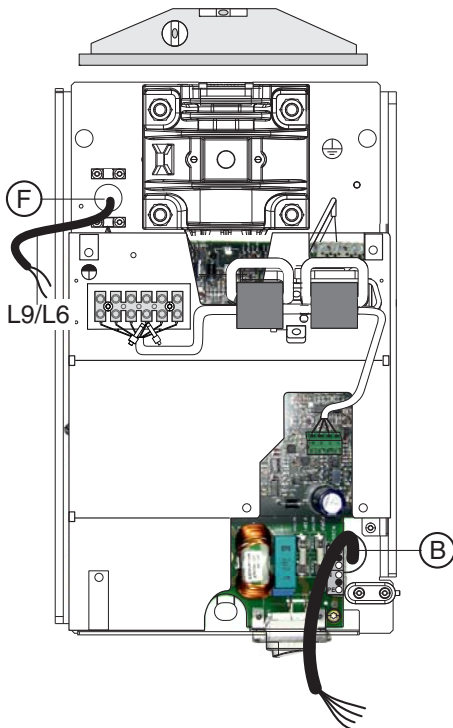
1. Remove wall adapter (P1) from the packaging.

CAUTION

Risk of damage

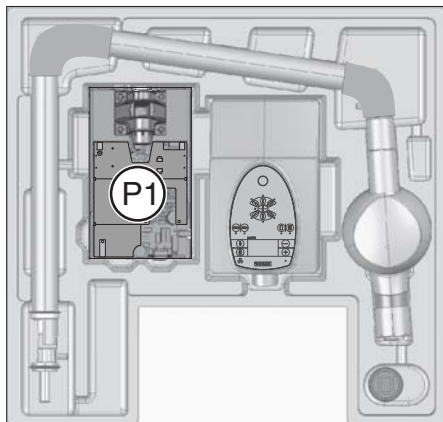
Make sure that board DX1 is not damaged during installation!

Observe ESD protective measures!



2. For the power cable: **Carefully** punch out opening **B** in the wall adapter with a punch.
3. Position the wall adapter on the prepared installation location.
4. Pull the power cable through the opening (**B**) in the wall adapter.
5. **For remote control / Remote Timer only (cable L6 or L9):** Pull the cable through the opening (**F**) in the wall adapter.
6. Screw the wall adapter onto the wall loosely to hold it in place.
7. Align the wall adapter with a spirit level and attach the wall adapter securely with suitable screws and washers, depending on the type of attachment.

6.1.3 Installation (surface installation)



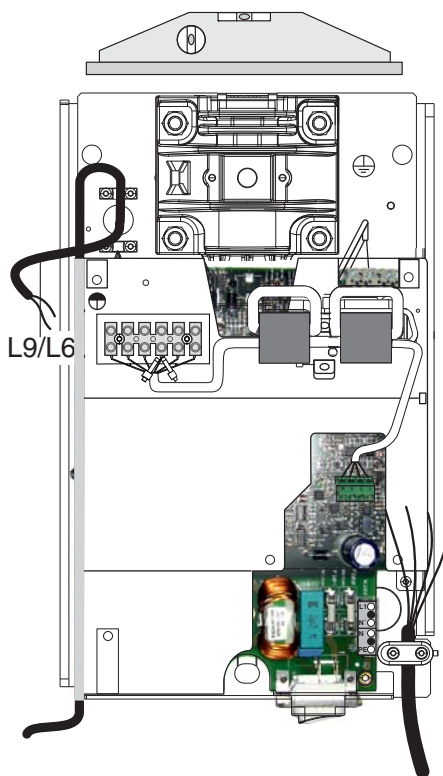
1. Remove wall adapter (P1) from the packaging.

CAUTION

Risk of damage

Make sure that board DX1 is not damaged during installation!

Observe ESD protective measures!



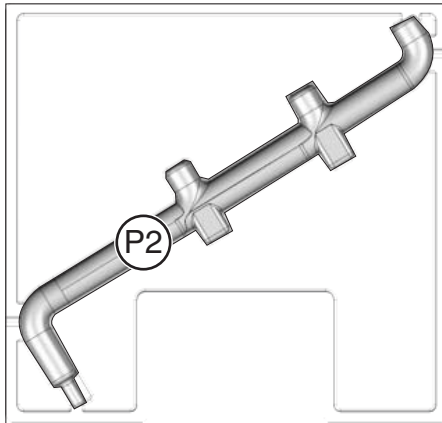
2. Position the wall adapter on the prepared installation location.
3. Screw the wall adapter onto the wall loosely to hold it in place.
4. Align the wall adapter with a spirit level and attach the wall adapter securely with suitable screws and washers, depending on the type of attachment.
5. Insert the power cable into the mounting plate from underneath and secure it with a cap clamp.

For remote control / Remote Timer only (cable L6 or L9):

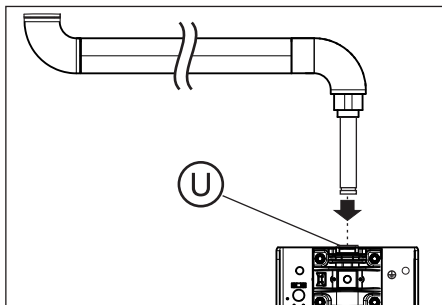
1. Unscrew the 3 screws from the EMC plate and suspend the EMC plate at the side, see Removing the EMC plate [→ 43].
2. Insert the cable (L6 or L9) into the mounting plate from underneath.
3. Route the cable toward the top along the side and secure it with a clamp.

6.2 Installing the round support arm and scissor arm

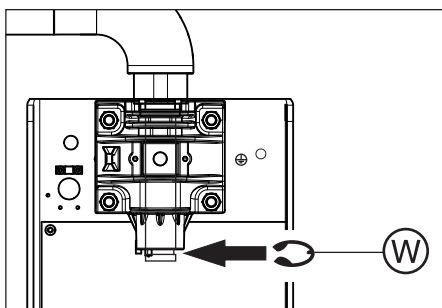
6.2.1 Installing the support arm



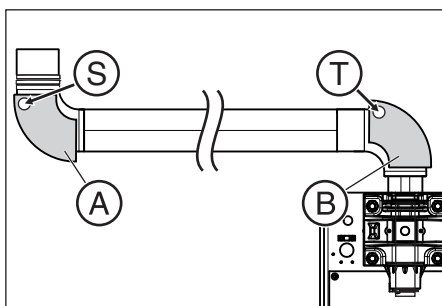
1. Remove support arm (P2) from the packaging.



2. Insert the support arm into the bearing (U).



3. After insertion, secure the support arm with a retaining ring (W) to prevent it from getting lifted out.



NOTICE

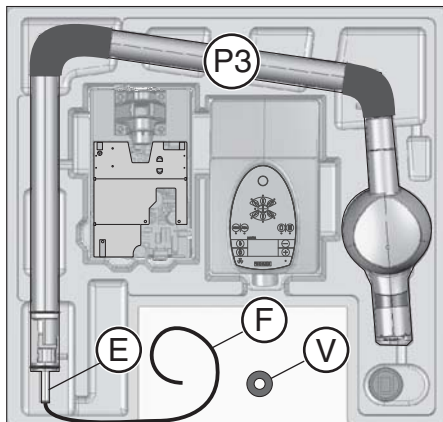
Risk of damaging housing parts

It is essential that you use only your hands when removing the housing shells (A and B).

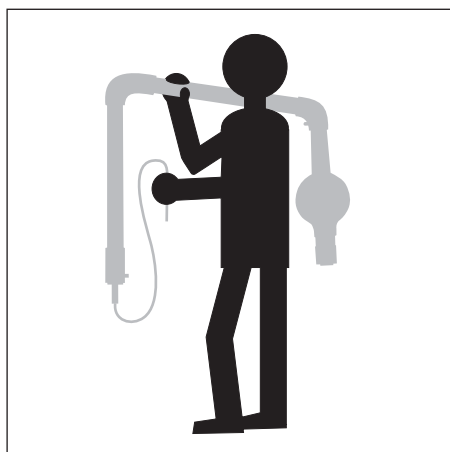
The surfaces of the housing shells will be damaged if you use any tools such as screwdrivers, etc.

4. Unlock the housing (A) by pressing the housing shells together at position S.
5. Remove the housing (A) from the support arm.
6. Unlock the housing (B) by pressing the housing shells together at position T.
7. Remove the housing (B) from the support arm.

6.2.2 Installing the scissor arm



1. Push the washer (V (inside diameter 20 mm)) over the arm cable (F) (Leave the scissor arm in the package for this step).
2. Place the washer (V) onto the spindle (E).
3. Remove the scissor arm (P3) from the packaging.



4. For transport and for the next installation step, support the scissor arm on your shoulder.

CAUTION

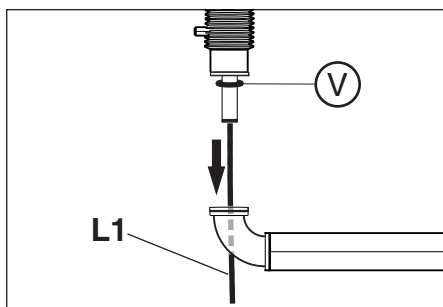
Risk of injury

Do not fold up the scissor arm in the uninstalled state.

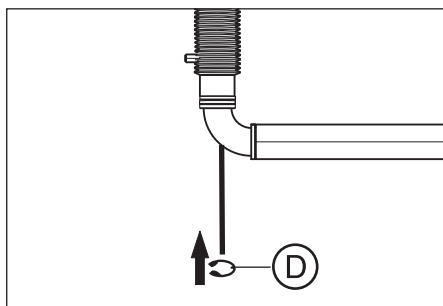
Carefully transport the scissor arm in the unfolded state!

NOTICE

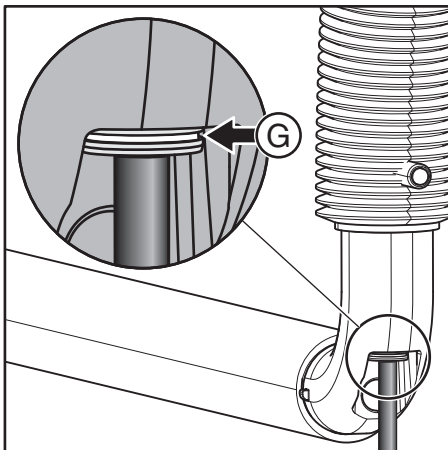
If the arm is to be laid down in the meantime, put it back in its packaging.



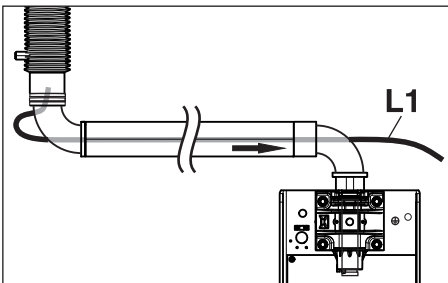
5. Route the arm cable (L1) downwards through the arm and insert the scissor arm. Make sure that the washer (V) does not fall off during this step.



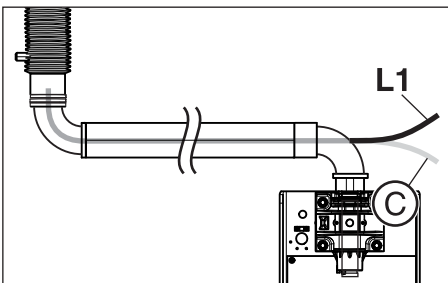
6. Push the retaining ring (D) through the arm cable



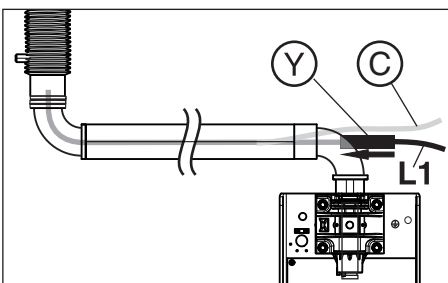
7. Snap the retaining ring into the groove (G).



8. Push the arm cable (L1) through the support arm.



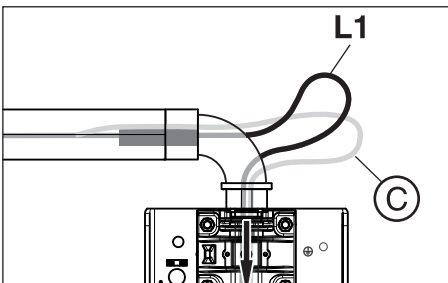
9. Disconnect the arm cable (L1) and the grounding strap (C) in the accessible area.



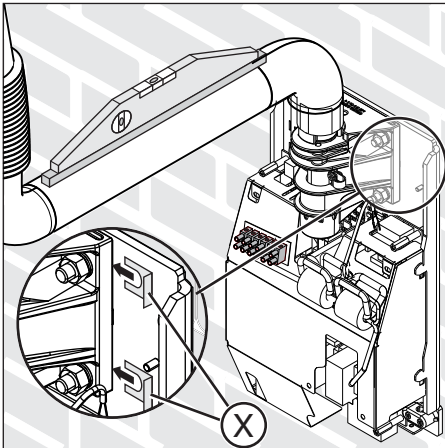
10. Thread the ferrite core (Y) **only** onto the arm cable (L1) and slide the ferrite core into the support arm.

NOTICE

The grounding strap must not be pulled through the ferrite core.



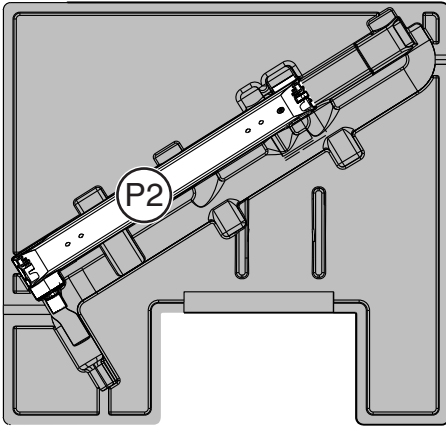
11. Now pull the grounding strap (C) downward through the bearing.
12. Pull the arm cable (L1) downward through the bearing.



- 13.** Check the support arm with the spirit level. If necessary, loosen the bearing mount (4 nuts) and place the shim (X) underneath.

6.3 Installing the angular support arm and scissor arm

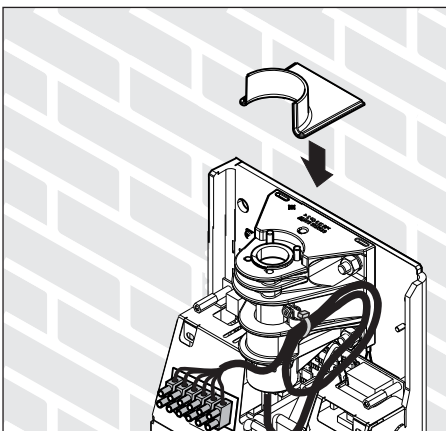
6.3.1 Installing the angular support arm



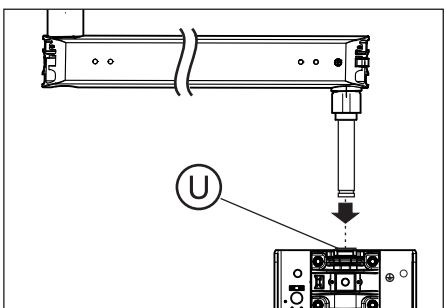
1. Remove support arm (P2) from the packaging.
2. Separate the ends of the threading aid from each other.

NOTICE

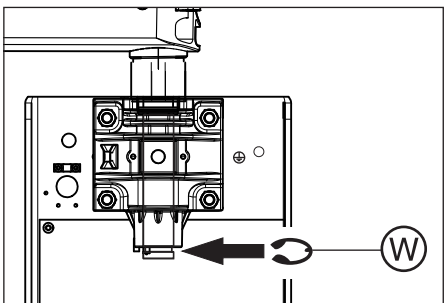
The threading aid must not be removed from the support arm, as threading the arm cable is much more difficult without the threading aid.



3. Set the cover of the arm connection onto the wall module as shown, between the support arm and the wall.

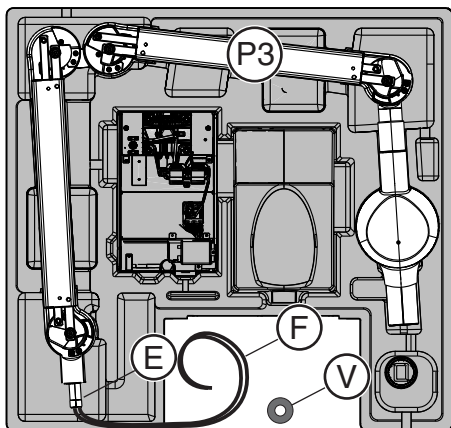


4. Thread the threading aid through the bearing. Position the support arm in the bearing (U).

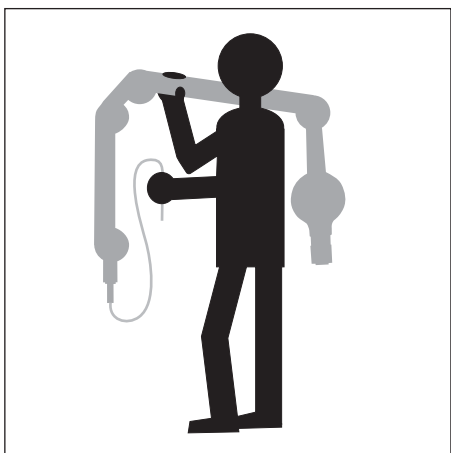


5. After insertion, secure the support arm with a retaining ring (W) to prevent it from getting lifted out.

6.3.2 Installing the angular scissor arm



1. Push the washer **V** (inside diameter 20 mm)) over the arm cable (**F**) (Leave the scissor arm in the package for this step).
2. Place the washer (**V**) onto the spindle (**E**).
3. Remove the scissor arm (**P3**) from the packaging.



4. For transport and for the next installation step, support the scissor arm on your shoulder.

CAUTION

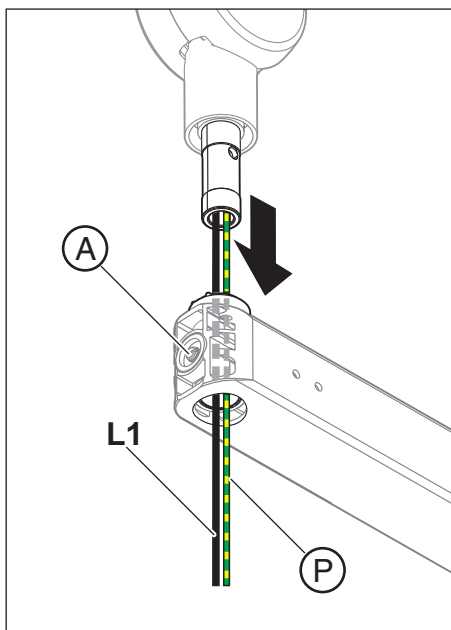
Risk of injury

Do not fold up the scissor arm in the uninstalled state.

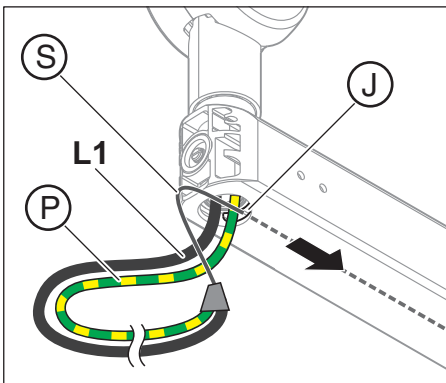
Carefully transport the scissor arm in the unfolded state!

NOTICE

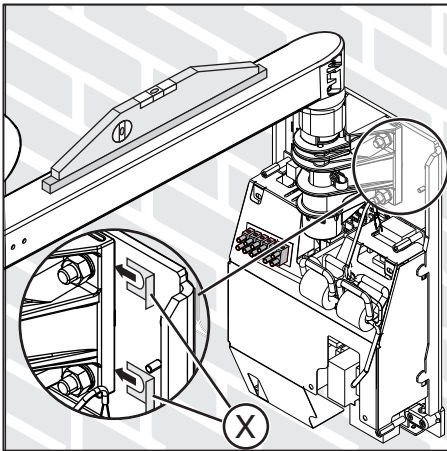
If the arm is to be laid down in the meantime, put it back in its packaging.



5. Route the arm cable **L1** and the ground cable (**P**) downwards through the arm and insert the scissor arm.
6. Adjust by tightening/loosening the screw (**A**) the rotatability of the scissor arm.

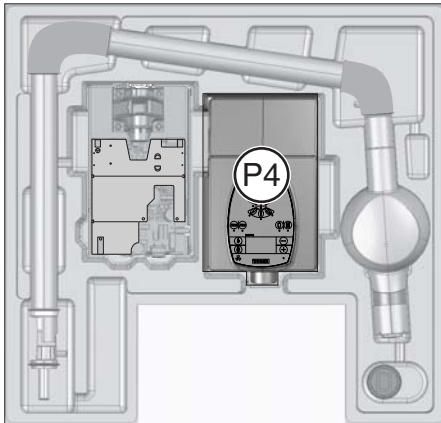


7. Connect the ends of the **L1** arm cable and the ground cable (**P**) with the threading aid (**S**), which is routed through the support arm.
8. Guide the **L1** arm cable and the ground cable (**P**) through the opening (**J**) of the support arm by simultaneously pulling on the threading aid (**S**) and slide the cable through again.
9. Pull the ground cable (**P**) and the arm cable **L1** downward until it goes through the support arm bearing in the wall adapter.

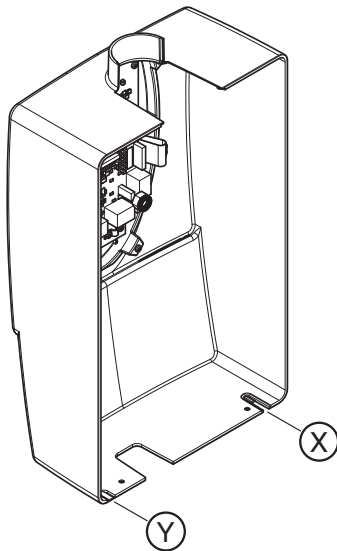


10. Check the support arm with the spirit level. If necessary, loosen the bearing mount (4 nuts) and place the shim (**X**) underneath.

6.4 Preparing the protective housing



1. Remove the protective cover (P4) from the packaging.



2. **Optional for surface mounting:** Punch out the necessary openings for the release (X) or the surface-mounted power supply (Y) in the protective cover.

6.5 Installing the remote control and the remote timer

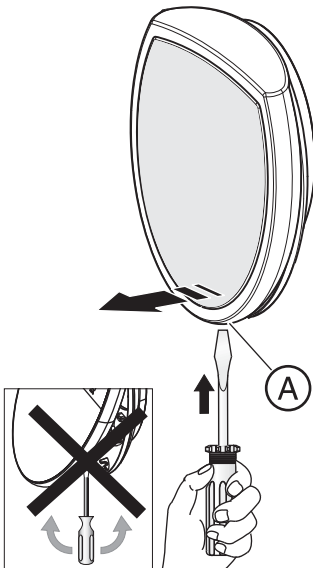
6.5.1 Wall-mounted installation

Scope

For installation options: 2, 3, 4, 5, 6, 6.1, 7 and 8

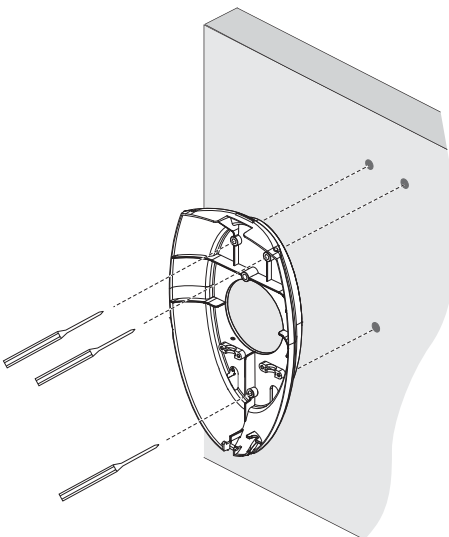
Preparation

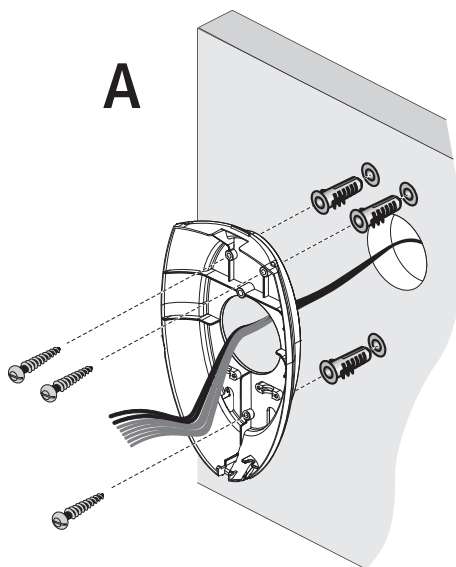
- Detach the housing of the remote control or the Remote Timer by carefully inserting the tip of a screwdriver in opening A and pressing against the catch. **Do not pry with or turn the screwdriver!**



Installation

1. Hold the chassis against the wall in its mounting position and mark the positions for the three drill holes.

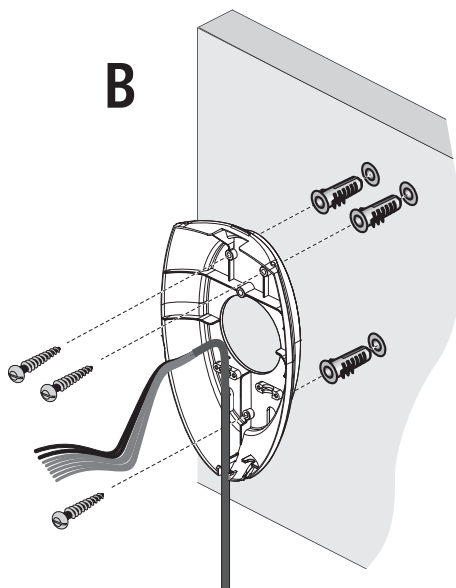


A

2. Drill the holes (6 mm (1/4") masonry drill bit) and insert the wall plugs.

IMPORTANT

For concealed installation (A), the control cable is drawn into the chassis from the rear. For surface installation it is drawn in from underneath.

B

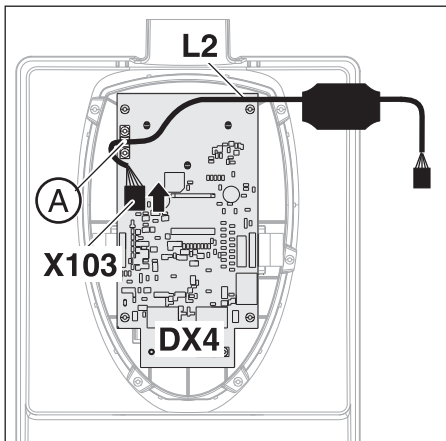
3. Fasten the chassis firmly to the wall with three screws.

6.5.2 Modifying the remote timer

Scope

For installation options: 3, 5, 7 and 8

Installation step 1 / Remote Timer



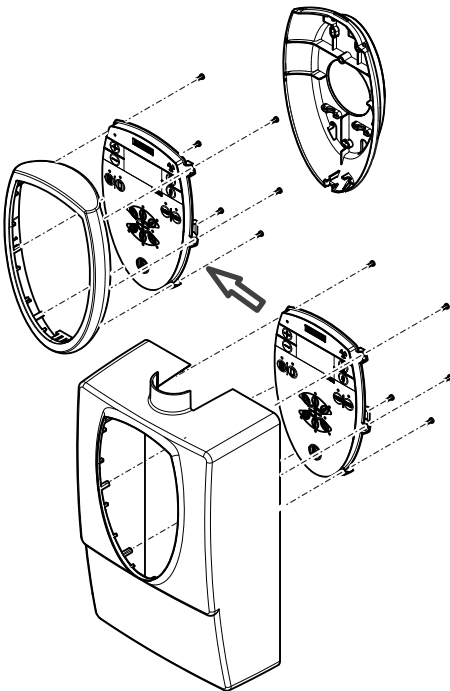
CAUTION

Risk of damage

Make sure that board **DX4** is not damaged during installation!

Observe ESD protective measures!

1. Unscrew and remove the clamp (A) from board **DX4**.
2. Remove cable **L2** from connecting strip **X103** on PC board **DX4**.
↳ Cable **L2** is no longer required.
3. Loosen the six screws fastening the control unit in the protective cover of the wall module.
4. Remove the control unit and screw it securely into the Remote Timer.



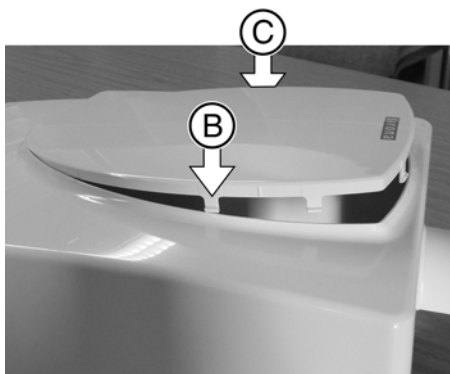
Installation step 2 / blank panel

Tip: It is easier to insert the blank panel if the protective cover is lying on a table and is pressed against its own body.

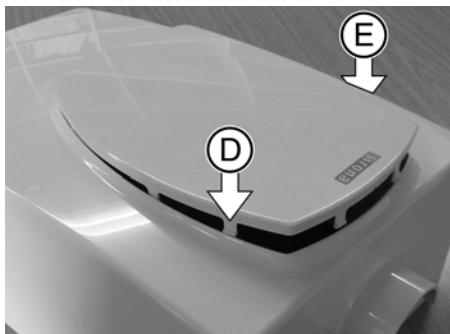
1. Place the blank panel on the opening in the protective cover of the wall module from the front.



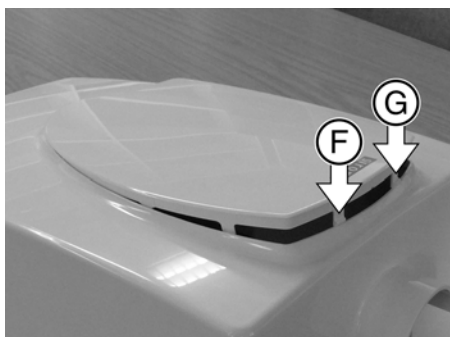
2. Press latching noses **B** and **C** inward so that the blank panel can easily be lowered into the protective cover.



3. Press latching noses **D** and **E** inward so that the blank panel can be lowered further into the protective cover.



4. Press latching noses **F** and **G** inward so that the blank panel can finally be lowered completely into the protective cover.



6.6 Installing the manual release holder

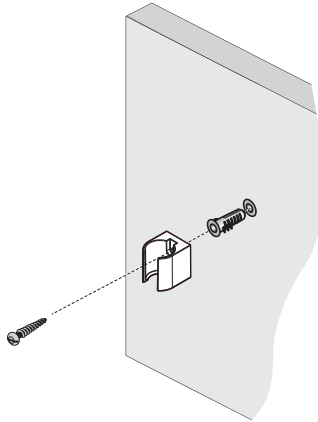
6.6.1 Installation on the wall

Scope

For installation options: 1, 2, 3, 4, 5, 6, 6.1 and 8

Installation

1. Drill the hole for the holder at the desired position.
2. Insert the wall plug.
3. Pull off the protective foil of the two-sided adhesive tape at the holder.
4. Stick the holder to the wall so that it fits over the drilled hole.
5. Fasten the holder tight.



6.6.2 Installation on the cover (wall module)

Scope

For installation option: 1

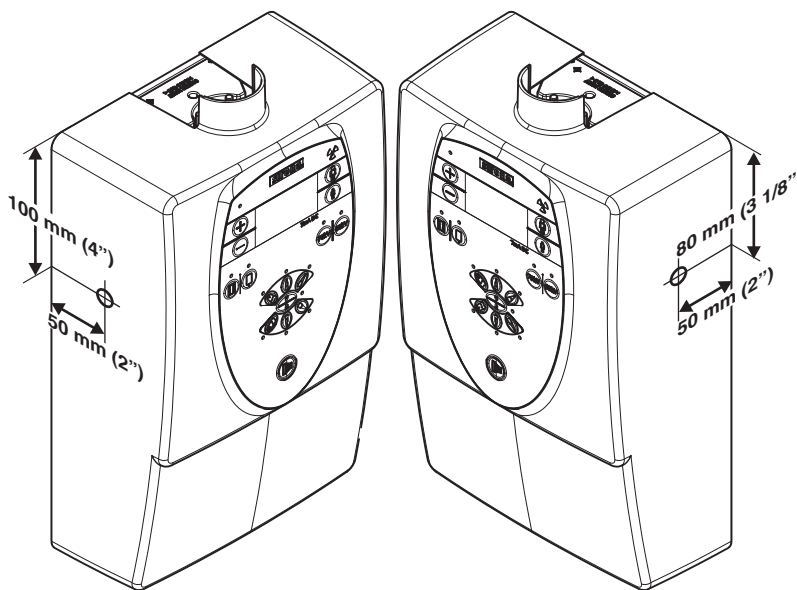
Installation

CAUTION

Important installation instructions

- Do **not** drill holes in the protective cover when it is attached! The protective cover must be removed.
- Only the specified positions may be drilled (Tolerance: ± 1 cm (3/8")).
- Use only the supplied screw. Otherwise there is a hazard due to live parts.

1. If the protective cover is already attached, remove it from the wall adapter.



2. Mark the drill hole (see drawing).

NOTICE

Different installation heights

Note that the installation heights vary according to the desired installation position (right/left).

3. Center punch the mark.
4. Drill a 4.3 mm (3/16") hole at the mark.
5. Pull off the protective foil of the two-sided adhesive tape at the holder.
6. Adhere the holder to the front of the protective cover to match the drilled hole (watch for top/bottom alignment).
7. Fasten the holder tight. Use the supplied (M4x16) screw, washer and nut for this purpose.

6.6.3 Installation on the protective cover of the remote control

Explanation

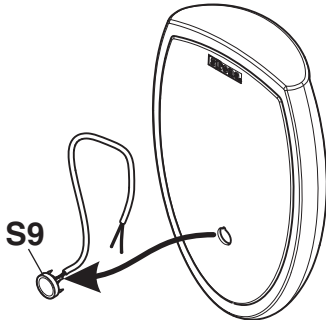
The protective cover must be modified to install the holder.

Scope

For installation options: 2, 4, 6 and 6.1

Modification

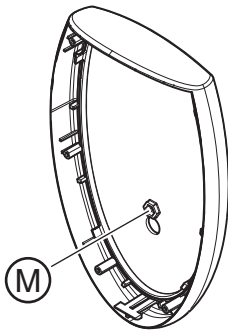
1. Remove the remote control release button (**S9**) from the protective cover.



2. Turn the protective cover over on its back.

↳ You will see a hexagonal recess (**M**).

3. Drill a 4.3 mm (3/16") hole at the center of the recess (**M**).

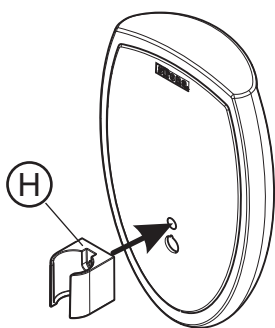


4. Pull off the protective foil of the two-sided adhesive tape at the holder (**H**).

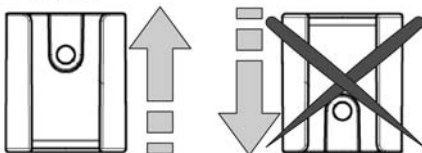
5. Adhere the holder (**H**) to the front of the cover to match the drilled hole (watch for top/bottom alignment).

6. Place an M4 hex nut into the recess (**M**).

7. Fasten the holder (**H**) with an M4x16 screw from the front.



OK



IMPORTANT

Make sure that the holder is mounted in the correct position.

7 Electrical connection

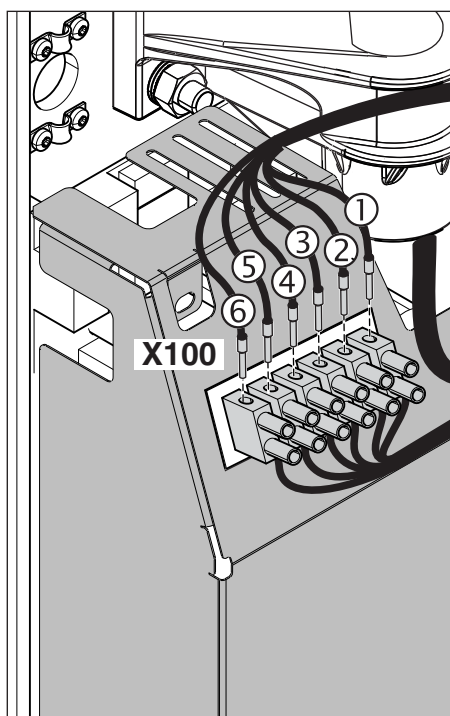
7.1 Connecting the arm cable

Wall model

- Connect the cable to terminal strip X100 on the opposite side so that the lead color codes match.

Lead colors (from top to bottom on terminal strip X100):

- 1 : blue (V)
- 2 : pink (W)
- 3 : gray/brown (negative)
- 4 : white (heating-)
- 5 : yellow (heating+)
- 6 : green (kVact)



For ceiling and device model

- Connect the cable from the ceiling stand/device model to the **X100** terminal strip in the wall adapter so that the lead color codes match.

7.2 Connecting the grounding strap

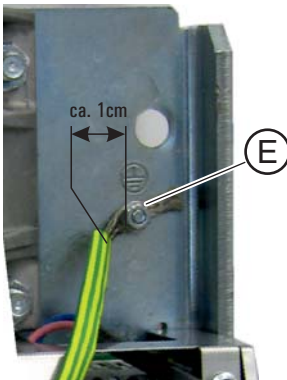
CAUTION

Risk of damage

The grounding strap must have enough play so that it is able to follow the support and scissor arms without restriction.

Connecting the grounding strap

1. Widen the grounding strap at the height of the ground point (E) (approx. 1 cm from the insulation) to create a hole.
2. To attach the grounding strap to the ground point, proceed as follows: Firstly position a contact washer on the grounding bolt, then the widened grounding strap, followed by a washer and then secure in place with a screw.



7.3 Connecting the control panel

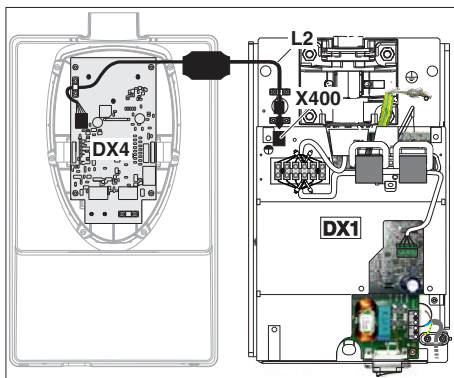
7.3.1 Direct connection (standard)

Scope

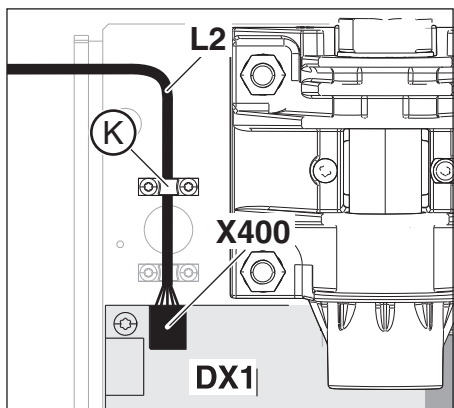
For installation options: 1, 2, 4, 6 and 6.1

Connection

1. Plug cable **L2** coming from PC board **DX4** onto connecting strip **X400** of PC board **DX1**.



2. Secure power cable **L2** with the strain relief (**K**).



NOTICE

The shielding of cable **L2** must be in flat contact with the shielding clamp (**K**).

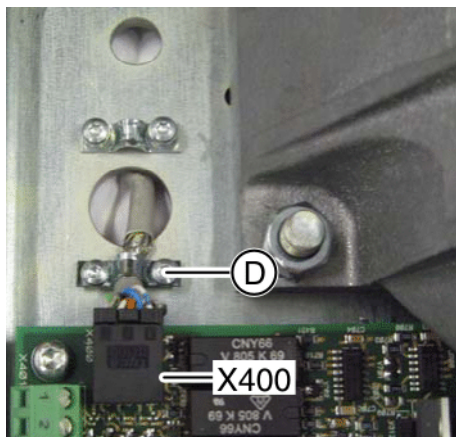
7.3.2 Connection to the remote timer

Scope

For installation options: 3, 5, 7 and 8

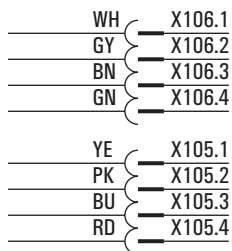
Connection

1. Plug cable **L6** into the connecting strip **X400** of PC board **DX1**.
2. Secure cable **L6** with the shielding clamp **(D)**.

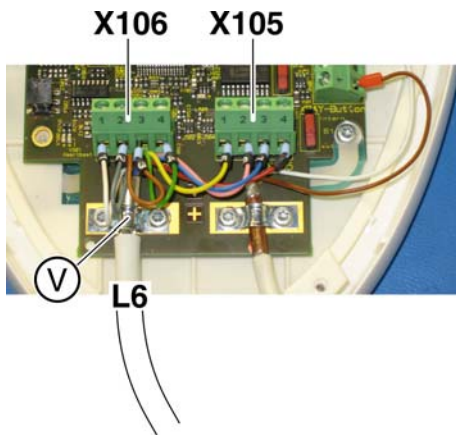


NOTICE

The shielding of cable **L6** must be in contact with the shielding clamp **(D)**.



3. Connect cable **L6** to strips **X105** and **X106** of PC board **DX4**.



4. Secure cable **L6** with the shielding clamp **(V)**.

NOTICE

The shielding of cable **L6** must be in flat contact with the shielding clamp **(V)**.

7.4 Connecting the release and the door contact

7.4.1 General

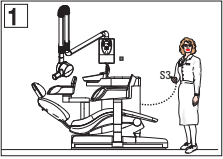
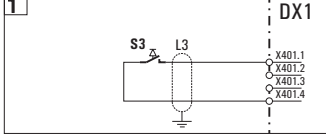
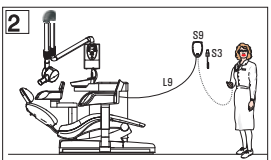
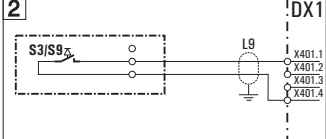
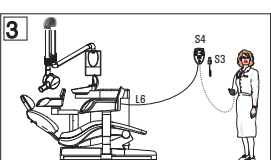
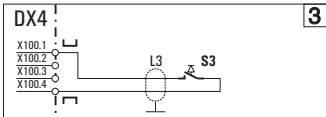
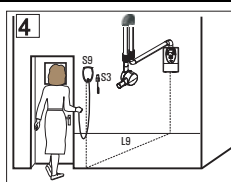
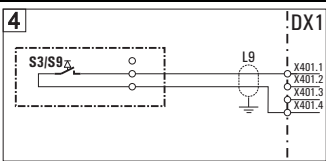
NOTICE

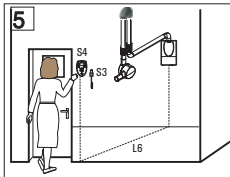
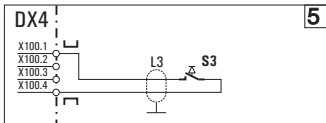
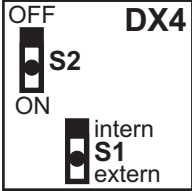
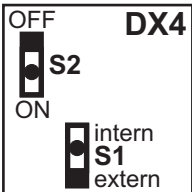
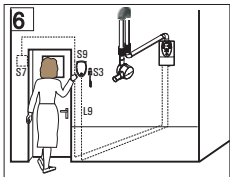
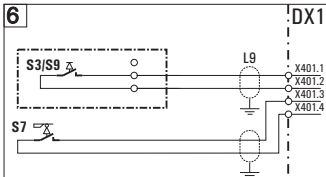
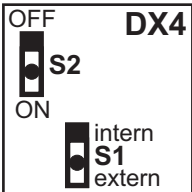
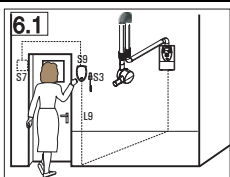
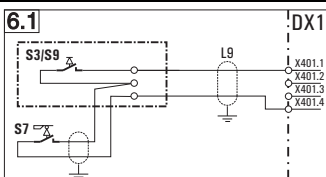
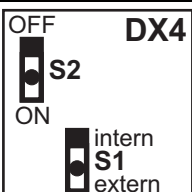
Only one release button may be connected.

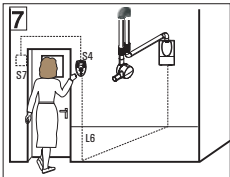
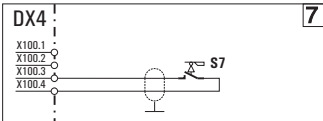
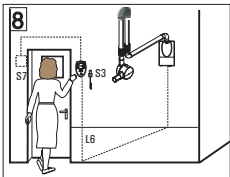
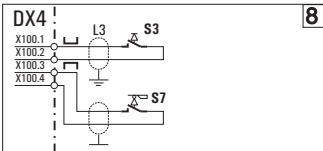
Designations of release buttons and door contact

- Manual release **S3**
 - Coiled cable
- Release key on the control membrane **S4**
 - Directly connected to control board DX4
- Remote control release key **S9**
 - Integrated in remote control housing
- Door contact (safety circuit) **S7**

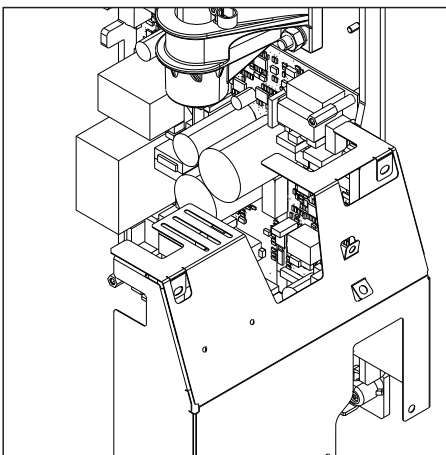
7.4.2 Overview

Installation option:	Structure:	Installation:	Switch setting S1 /S2 (DX4)
1. Release in the treatment room without remote control See section "Installation option 1 [→ 44]".			OFF DX4  ON  intern S1  extern
2. Release in the treatment room with remote control See section "Installation option 2 [→ 45]".			OFF DX4  ON  intern S1  extern
3. Release in the treatment room with Remote Timer See section "Installation option 3 [→ 47]".			Installation with manual release S3: OFF DX4  ON  intern S1  extern
			Installation with release button on control membrane S4: OFF DX4  ON  intern S1  extern
4. Release outside of the X-ray room with remote control See section "Installation option 4 [→ 49]".			OFF DX4  ON  intern S1  extern

Installation option:	Structure:	Installation:	Switch setting S1 /S2 (DX4)
5. Release outside of the X-ray room with Remote Timer See section "Installation option 5 [→ 51]".			Installation with manual release S3: 
			Installation with release button on control membrane S4: 
6. Release outside of the X-ray room with remote control, door contact safety circuit See section "Installation option 6 [→ 53]".			
6.1. Release outside of the X-ray room with remote control, door contact safety circuit See section "Installation option 6.1 [→ 56]".			

Installation option:	Structure:	Installation:	Switch setting S1 /S2 (DX4)
7. Release outside of the X-ray room with Remote Timer, door contact safety circuit Installation with release button on control membrane S4. See section "Installation option 7 [→ 59]".			OFF DX4 S2 ON intern S1 extern NOTICE! Service routine S15 = value "<i>Off</i>"
8. Release outside of the X-ray room with Remote Timer, door contact safety circuit Installation with manual release S3 See section "Installation option 8 [→ 60]".			OFF DX4 S2 ON intern S1 extern NOTICE! Service routine S15 = value "<i>Off</i>"

7.4.2.1 Removing the EMC plate



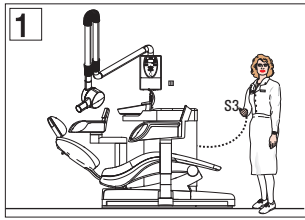
- ✓ The EMC plate must be removed if the release button or the door switch on X401 is to be connected to the DX1.
- 1. Unscrew the 3 screws from the EMC plate and suspend the EMC plate at the side.
- 2. In the case of cable **L3** (spiral cable): Place the ferrite core of the spiral cable inside the EMC plate.
- 3. Screw the EMC plate back in securely after connecting the release button or the door switch.

7.4.3 Installation option 1

Structure

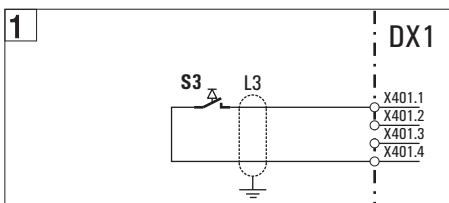
Release in the treatment room **without** remote control

- Release
 - Manual release **S3**



Installation

1. Connect manual release **S3** (coiled cable) to **X401** on board **DX1** at connectors **X401.1** and **X401.4**.

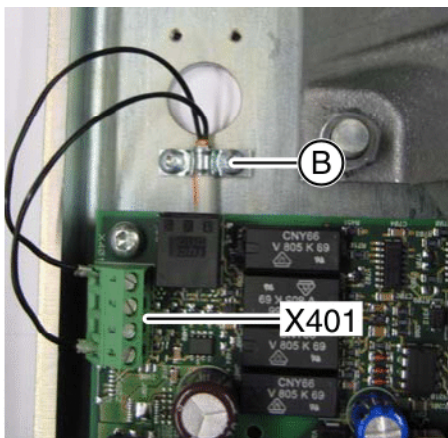


2. Secure the coiled cable with the shielding clamp (**B**).

NOTICE

The shielding of the coiled cable must be in flat contact with the shielding clamp (**B**).

3. **Check** the setting of switch **S1** on PC board DX4. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]).
4. **Check** the setting of switch **S2** on PC board DX4. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

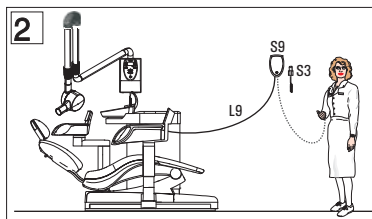


7.4.4 Installation option 2

Configuration

Release in the treatment room **with** remote control

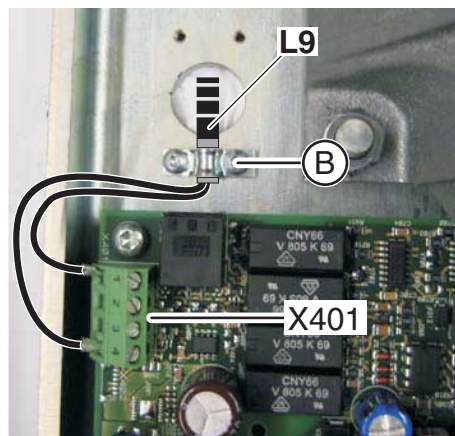
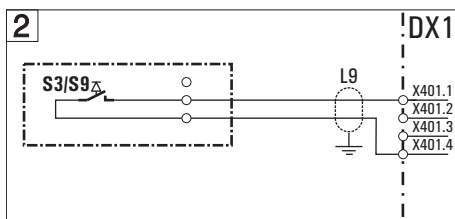
- Release
 - Manual release **S3**
 - or
 - Remote control release key **S9**



Prerequisites

- The remote control has been installed (see section "Installing the remote control/remote timer [→ 29]").
- Only with use of the manual release **S3** (coiled cable):
 - The holder for manual release **S3** was attached to the cover of the remote control. See section "Installation on the protective cover of the remote control [→ 35]".

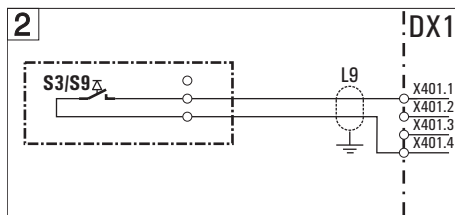
Installation of cable L9 (on DX1)



1. Connect cable **L9** to connectors **X401.1** and **X401.4** on PC board **DX1**.
2. Secure cable **L9** with the shielding clamp **(B)**.

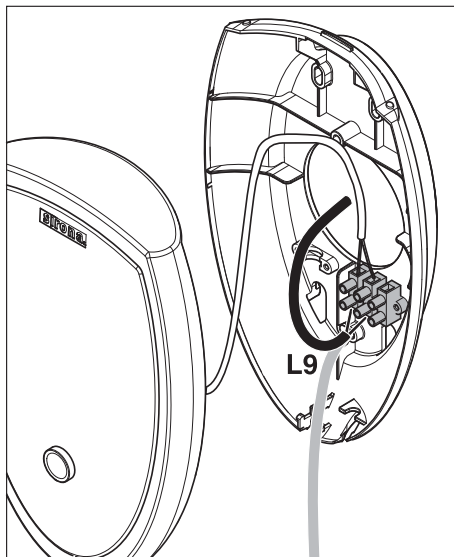
NOTICE

The shielding of cable **L9** must be in flat contact with the shielding clamp **(B)**.

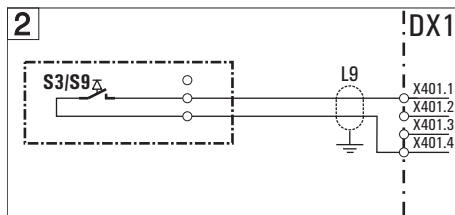
Installation with remote control release button S9

➤ Connect cable **L9** and remote control release button **S9** to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation

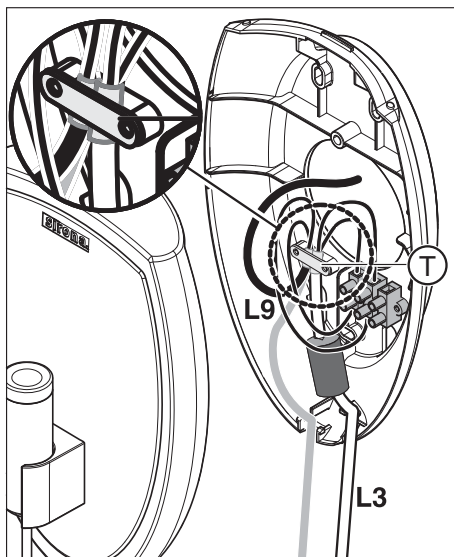


1. **Check** the setting of switch **S1** on PC board DX4. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]).
2. **Check** the setting of switch **S2** on PC board DX4. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

Installation with manual release S3

➤ Connect cable **L9** and coiled cable **L3** to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation



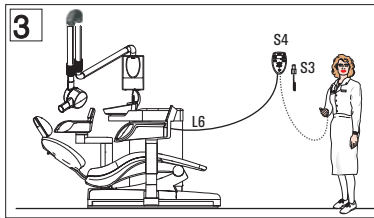
1. Connect the shield of cable **L9** to the shield of coiled cable **L3** underneath the strain relief clamp (**T**).
2. **Check** the setting of switch **S1** on PC board DX4. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]).
3. **Check** the setting of switch **S2** on PC board DX4. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

7.4.5 Installation option 3

Configuration

Release in the treatment room **with** Remote Timer

- Release
 - Manual release **S3**
 - or
 - Release key on the control membrane **S4**



NOTICE

Length of cable supplied for Remote Timer approx. 10 meters (394") (must not be extended).

Conduit int. dia. at least 12 mm (1/2").

Prerequisites

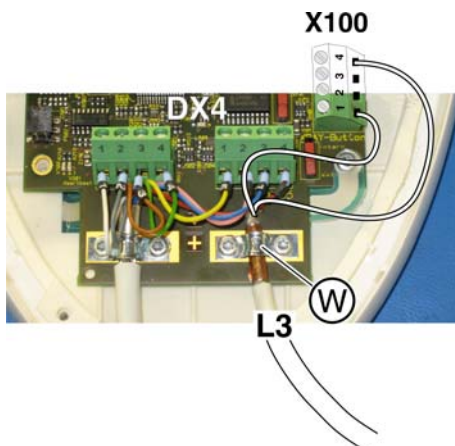
- The Remote Timer has been installed (see section "Installing the remote control/remote timer [→ 29]").
- The Remote Timer has been modified (see section "Modifying the remote timer [→ 31]").
- Only with use of manual release **S3** (coiled cable):
 - The holder for manual release **S3** has been attached next to the Remote Timer.

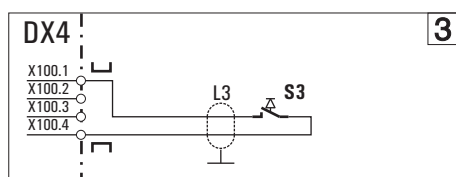
Installation with release button on control membrane S4

1. Set switch **S1** on PC board **DX4** to "*internal*" (see section "Selection of the release button" [→ 79]).
2. **Check** the switch setting of **S2**. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

Installation with manual release S3

1. Use the clamp (**W**) to fasten the manual release cable (**L3**) on PC board **DX4**. The shielding of the cable must be in flat contact with the clamp (**W**).





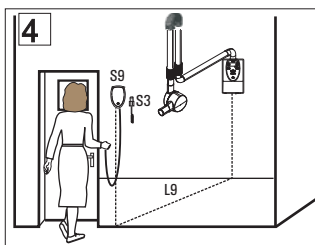
2. Connect manual release **S3** to the connecting strip at **X100.1** and **X100.4** on PC board **DX4**.
3. **Check** the setting of switch **S1** on PC board **DX4**. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]).
4. **Check** the setting of switch **S2** on PC board **DX4**. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

7.4.6 Installation option 4

Configuration

Release outside of the X-ray room **with** remote control

- Release
 - Manual release **S3**
 - or
 - Remote control release key **S9**



NOTICE

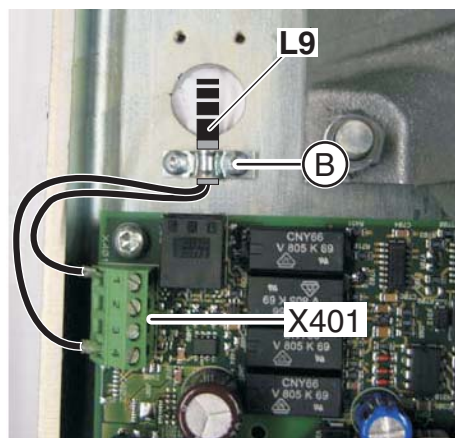
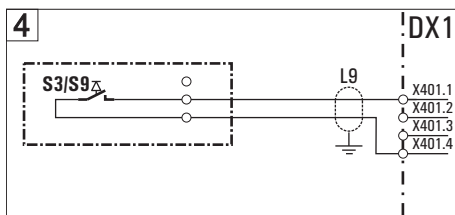
Installation prerequisites

Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.

Prerequisites

- The remote control has been installed (see section "Installing the remote control/remote timer [→ 29]").
- Only with use of the manual release **S3** (coiled cable):
 - The holder for manual release **S3** was attached to the cover of the remote control. See section "Installation on the protective cover of the remote control [→ 35]".

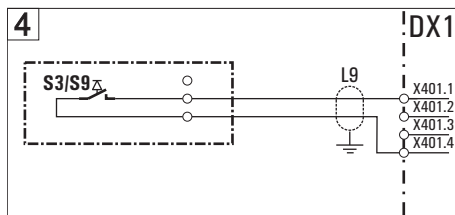
Installation of cable L9 (on DX1)



1. Connect cable **L9** to connectors **X401.1** and **X401.4** on PC board **DX1**.
2. Secure cable **L9** with the shielding clamp (**B**).

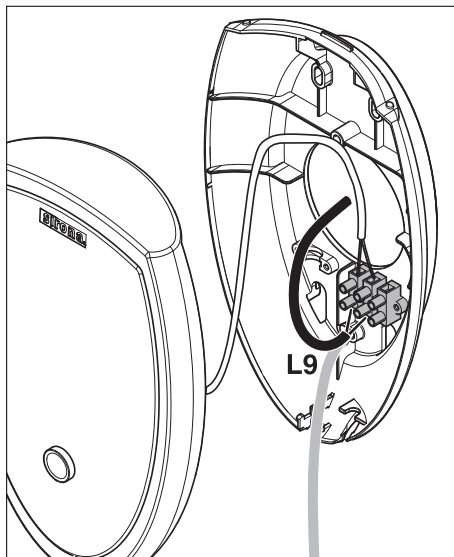
NOTICE

The shielding of cable **L9** must be in flat contact with the shielding clamp (**B**).

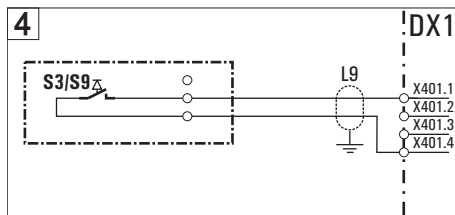
Installation with remote control release button S9

➤ Connect cable **L9** and remote control release button **S9** to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation

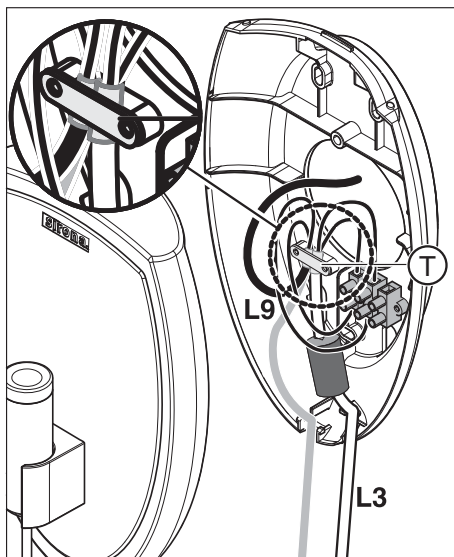


1. **Check** the setting of switch **S1** on PC board DX4. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]).
2. **Check** the setting of switch **S2** on PC board DX4. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

Installation with manual release S3

➤ Connect cable **L9** and coiled cable **L3** to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation



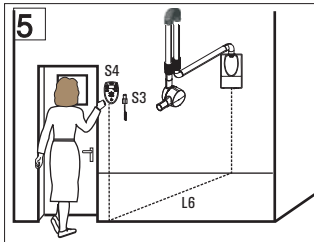
1. Connect the shield of cable **L9** to the shield of coiled cable **L3** underneath the strain relief clamp (**T**).
2. **Check** the setting of switch **S1** on PC board DX4. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]):
3. **Check** the setting of switch **S2** on PC board DX4. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

7.4.7 Installation option 5

Configuration

Release outside of the X-ray room **with** Remote Timer

- Release
 - Manual release **S3**
or
 - Release key on the control membrane **S4**



NOTICE

Length of cable supplied for Remote Timer approx. 10 meters (394") (must not be extended).

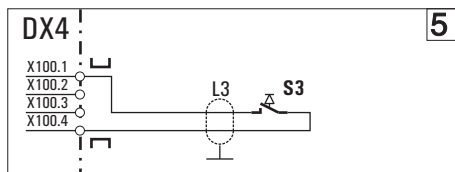
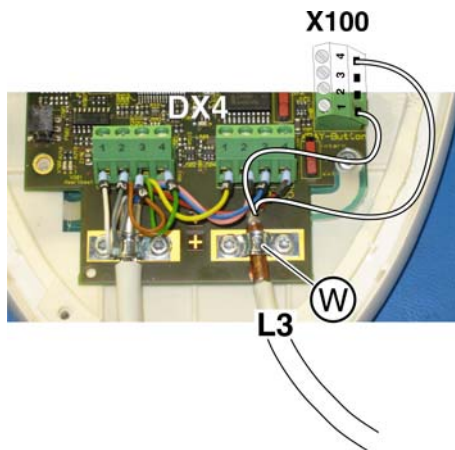
Conduit int. dia. at least 12 mm (1/2").

Prerequisites

- The Remote Timer has been installed (see section "Installing the remote control/remote timer [→ 29]").
- The Remote Timer has been modified (see section "Modifying the remote timer [→ 31]").
- Only with use of the manual release **S3** (coiled cable):
 - The holder for manual release **S3** has been attached next to the Remote Timer.

Installation with release button on control membrane **S4**

1. Set switch **S1** to "*internal*" (see section on "Selection of the release button [→ 79]").
2. **Check** the switch setting of **S2**. Switch **S2** must be set to "*ON*" (see section "Service routine **S15** [→ 81]").

Installation with manual release S3

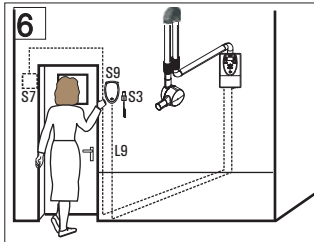
1. Use the clamp (W) to fasten the manual release cable (L3) on PC board DX4. The shielding of the cable must be in flat contact with the clamp (W).
2. Connect manual release S3 to the connecting strip at X100.1 and X100.4 on PC board DX4.
3. **Check** the setting of switch S1 on PC board DX4. Switch S1 must be set to "external". (see section entitled "Selection of the release button [→ 79]"):
4. **Check** the setting of switch S2 on PC board DX4. Switch S2 must be set to "ON" (see section "Service routine S15 [→ 81]").

7.4.8 Installation option 6

Configuration

Release outside of the X-ray room **with** remote control, door contact safety circuit

- Door contact
 - Door contact **S7** wired to the wall adapter
- Release
 - Manual release **S3**
or
 - Remote control release key **S9**



NOTICE

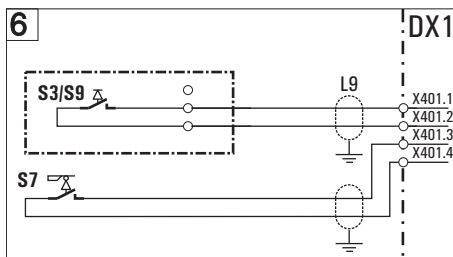
Installation requirement

Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.

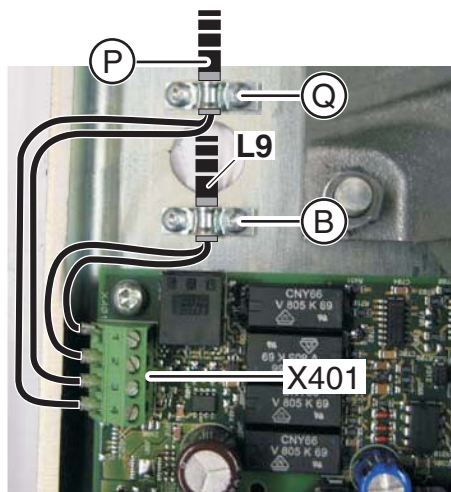
Prerequisites

- The remote control has been installed (see section "Installing the remote control/remote timer [→ 29]").
- Only with use of the manual release **S3** (coiled cable):
 - The holder for manual release **S3** was attached to the cover of the remote control. See section "Installation on the protective cover of the remote control [→ 35]".

Installation of cable L9 and door contact on board DX1



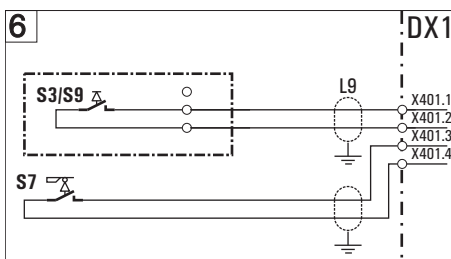
1. Connect cable **L9** to connectors **X401.1** and **X401.2** on PC board **DX1**.



2. Secure cable **L9** with the shielding clamp (**B**).
3. Connect cable (**P**) of door contact **S7** to connectors **X401.3** and **X401.4** on PC board **DX1**.
4. Secure cable (**P**) with the shielding clamp (**Q**).

NOTICE

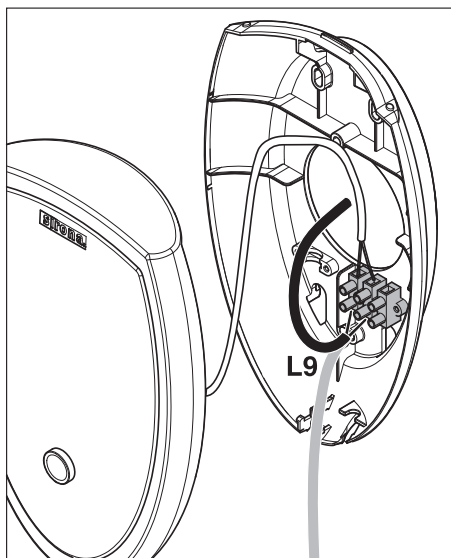
The shields of cables **L9** and **Q** must be in flat contact with the shielding clamps.



Installation with remote control release button S9

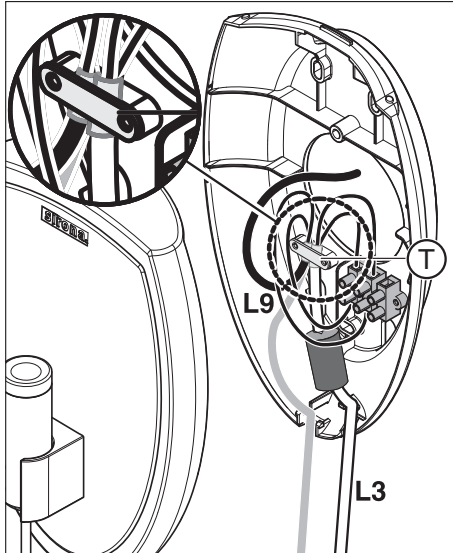
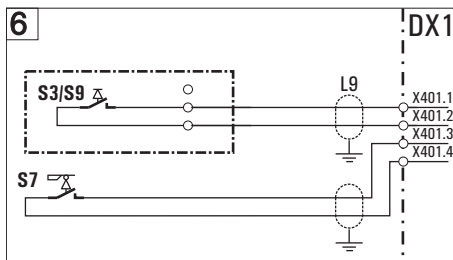
➤ Connect cable **L9** and remote control release button **S9** to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation



1. **Check** the setting of switch **S1** on PC board DX4. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button" [→ 79]).
2. **Check** the setting of switch **S2** on PC board DX4. Switch **S2** must be set to "*ON*" (see section "Service routine S15" [→ 81]).

Installation with manual release S3



➤ Connect cable **L9** and coiled cable **L3** to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation

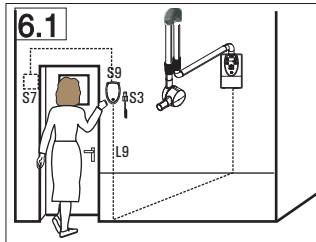
1. Connect the shield of cable **L9** to the shield of coiled cable **L3** underneath the strain relief clamp (**T**).
2. **Check** the setting of switch **S1** on PC board **DX4**. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button [→ 79]"):
3. **Check** the setting of switch **S2** on PC board **DX4**. Switch **S2** must be set to "*ON*" (see section "Service routine S15 [→ 81]").

7.4.9 Installation option 6.1

Configuration

Release outside of the X-ray room **with** remote control, door contact safety circuit

- Door contact
 - Door contact **S7** wired to the remote control housing
- Release
 - Manual release **S3**
or
 - Remote control release key **S9**



NOTICE

Installation requirement

Use of the remote control is permissible only if the yellow X-Ray LED is visible to the operating personnel during radiation release.

As in installation version 6:

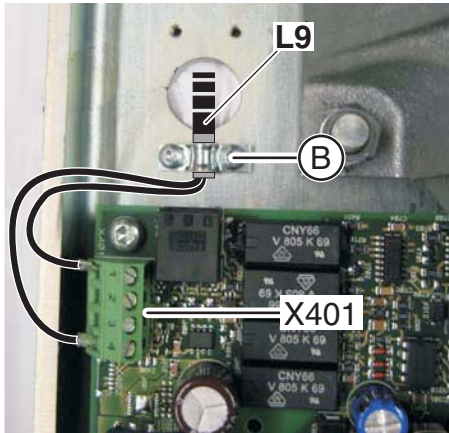
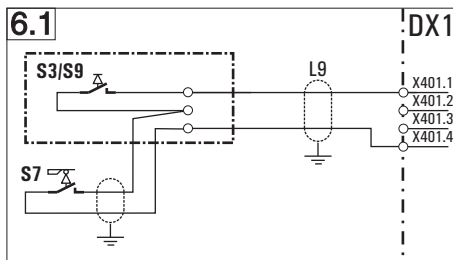
Exception

Door contact wired via remote control.

Prerequisites

- The remote control has been installed (see section "Installing the remote control/remote timer [→ 29]").
- Only with use of the manual release **S3** (coiled cable):
 - The holder for manual release **S3** was attached to the cover of the remote control. See section "Installation on the protective cover of the remote control [→ 35]".

Installation of cable L9 (on DX1)

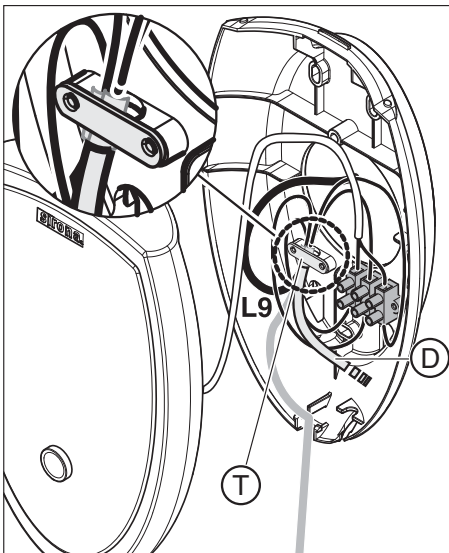
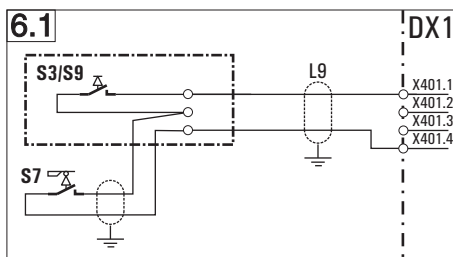


1. Connect cable **L9** to connectors **X401.1** and **X401.4** on PC board **DX1**.
2. Secure cable **L9** with the shielding clamp (**B**).

NOTICE

The shielding of cable **L9** must be in flat contact with the shielding clamp (**B**).

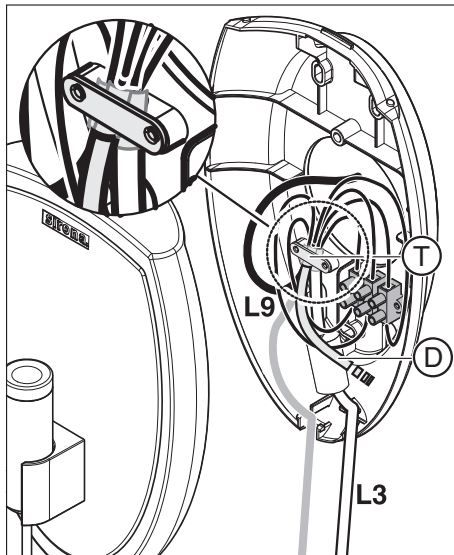
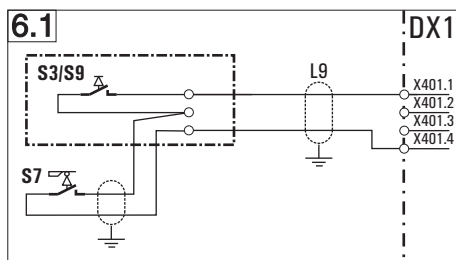
Installation with remote control release button S9



- Connect cable **L9**, release button **S9**, and the door contact cable to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation

1. Connect the shield of cable **L9** to the shield of door contact **D** underneath the strain relief clamp (**T**).
2. **Check** the setting of switch **S1** on PC board **DX4**. Switch **S1** must be set to "*external*". (see section entitled "Selection of the release button [→ 79]"):
3. **Check** the setting of switch **S2** on PC board **DX4**. Switch **S2** must be set to "*ON*" (see section "Service routine S15 [→ 81]").

Installation with manual release S3

1. Connect the shield of cable L9 to the shield of coiled cable L3 underneath the strain relief clamp.

2. Connect cable L9, release button S9, and the door contact cable (D) to the 3-pin terminal as shown.

- Cable drawn in black = concealed installation
- Cable drawn in gray = surface installation

1. Connect the shield of cable L9 to the shield of spiral cable L3 and the shield of the door contact cable (D) underneath the strain relief clamp (T).
2. **Check** the setting of switch S1 on PC board DX4. Switch S1 must be set to "*external*". (see section entitled "Selection of the release button [→ 79]"):
 3. **Check** the setting of switch S2 on PC board DX4. Switch S2 must be set to "*ON*" (see section "Service routine S15 [→ 81]").

7.4.10 Installation option 7

Configuration

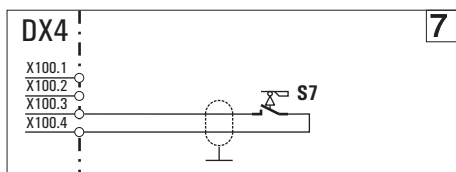
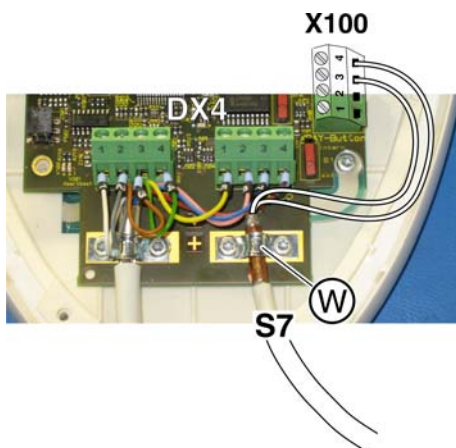
Release outside of the X-ray room **with** Remote Timer, door contact safety circuit

- Door contact
 - Door contact **S7**
- Release
 - Release key on the control membrane **S4**

Prerequisites

- The Remote Timer has been installed (see section "Installing the remote control/remote timer [→ 29]").
- The Remote Timer has been modified (see section "Modifying the remote timer [→ 31]").

Installation



1. Use the clamp (**W**) to fasten the door contact cable (**S7**) on PC board **DX4**. The shielding of the cable must be in flat contact with the clamp (**W**).
2. Connect the cable of door contact **S7** to the connecting strip at **X100.3** and **X100.4** on board **DX4**.
3. On PC board **DX4**, set switch **S1** to "*internal*" (see Section "Selection of the release button [→ 79]").
4. On board **DX4**, set switch **S2** to "*OFF*" and activate "*Off*" in service routine **S15** (see section on "Service routines [→ 80]")

7.4.11 Installation option 8

Configuration

Release outside of the X-ray room **with** Remote Timer, door contact safety circuit

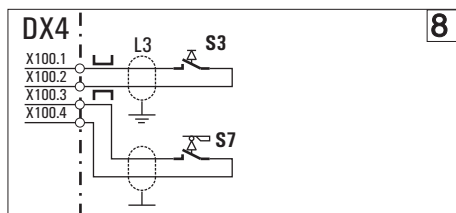
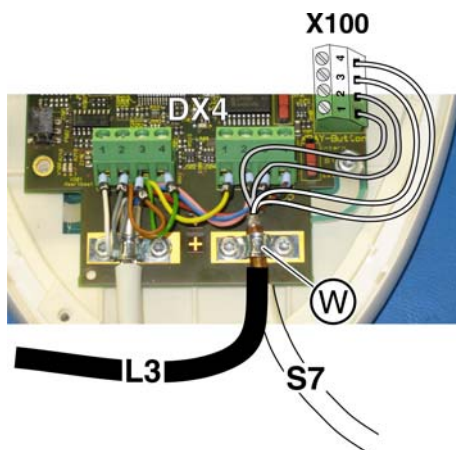
- Door contact
 - Door contact **S7** wired to Remote Timer
- Release
 - Manual release **S3**

Prerequisites

- The Remote Timer has been installed (see section "Installing the remote control/remote timer [→ 29]").
- The Remote Timer has been modified (see section "Modifying the remote timer [→ 31]").
- The holder for manual release **S3** has been attached next to the Remote Timer.

Installation

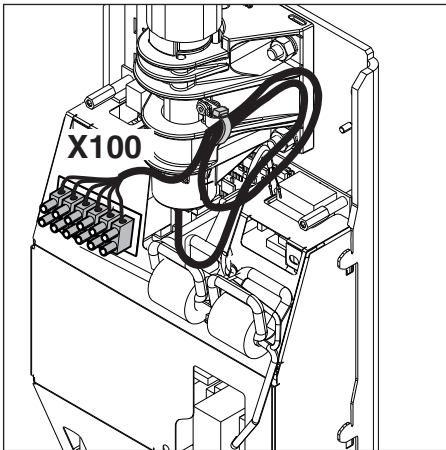
1. Use the clamp (**W**) to fasten the manual release cable (**L3**) and the door contact cable (**S7**) on PC board **DX4**. The shielding of the cables must be in flat contact with the clamp (**W**).



2. Connect manual release **S3** to the connecting strip at **X100.1** and **X100.2** on PC board **DX4**.
3. Connect the cable of door contact **S7** to the connecting strip at **X100.3** and **X100.4** on board **DX4**.
4. **Check** the setting of switch **S1** on PC board **DX4**. Switch **S1** must be set to "*external*" (see section on "Selection of the release button [→ 79]").
5. On board **DX4**, set switch **S2** to "*OFF*" and activate "*Off*" in service routine **S15** (see section on "Service routines [→ 80]").

7.5 Completion

Rolling up the arm cable



- Roll up the extra lengths of cable L1 and of the grounding strap to the right of the bearing block and secure the cable roll with a cable tie on the cable clamp.

7.6 Preparing the power connection

General

NOTICE

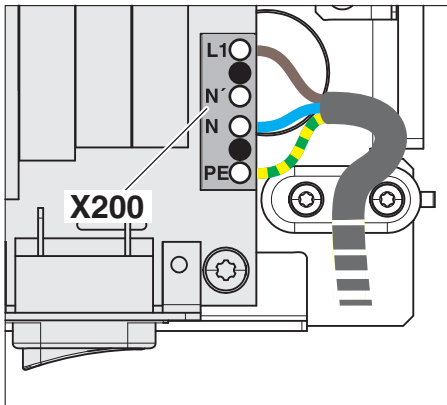
The Heliodent^{Plus} wall model is suitable for fixed installation only.

⚠ CAUTION

Observe the permissible nominal voltage range!

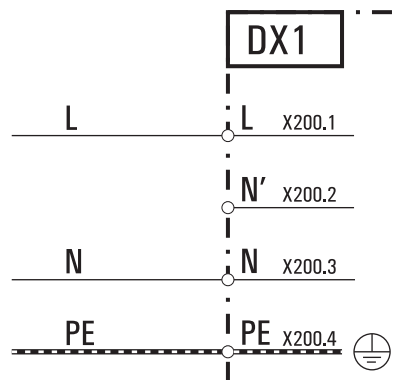
The unit can be connected to 120 V (1-phase connection) or to 200 - 240 V (1- or 2-phase connection), for all other voltages a pre-transformer is required. As a ceiling model or device model, the HELIODENT^{PLUS} must **only be connected to 200 - 240 V** (1 or 2-phase connection).

1-phase connection

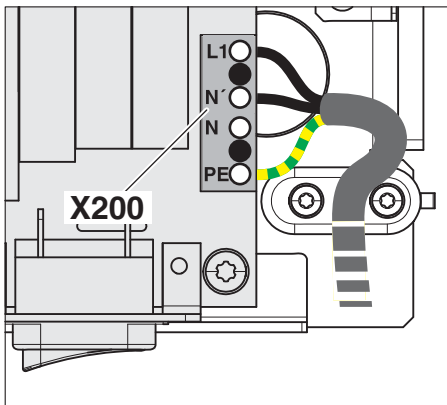


- Attach the power cable to X200 on DX1.
Do not connect it due to initial test of protective ground wire and device leakage current, see

- X200.1: L1 (phase 1)
- X200.2: N' (**Do not use!**)
- X200.3: N
- X200.4: PE

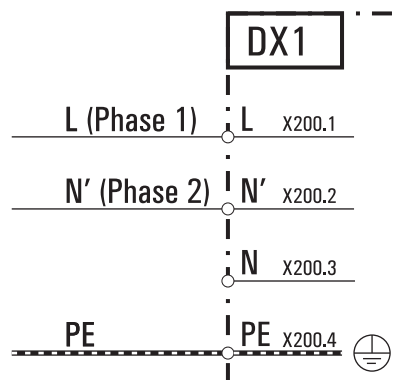


2-phase connection



- Attach the power cable to X200 on DX1.
Do not connect it due to initial test of protective ground wire and device leakage current, see

- X200.1: L1 (phase 1)
- X200.2: N' (phase 2)
- X200.3: N (**Do not use!**)
- X200.4: PE



8 Starting up

8.1 Functional test

8.1.1 Overview

Explanation

A functional test must be performed according to the following procedure.

Step 1

1. Check the protective ground wires and the device leakage current according to IEC 62353: 2007 (see section "Protective conductor test [→ 64]" and "Leakage current test [→ 66]").
Record the measured values in chapter 3 of the document "Inspection, maintenance and safety-related check".
2. **Connect the power cable now.**

Step 2

- Check the function of the X-ray tube assembly (see Section "Checking the X-ray tube assembly [→ 68]").

Step 3

At least one of the following tests must be performed, depending on which measuring instruments are available:

- Check the tube current (see the section entitled "Checking the tube current [→ 68]").

or

- Review the exposure time and high voltage kV (see Section "Checking exposure time and high voltage kV [→ 70]").

Step 4

- Check the deadman function (see section "Deadman function of the release [→ 71]").

8.1.2 Protective conductor test

Auxiliary devices required

- Power source

Technical data:

- No-load voltage **max.** 6V.
- Short-circuit current **min.** 5A - **max.** 25A

- Ammeter

- Observe the current intensity of the power source

- Voltmeter

Preparation

WARNING

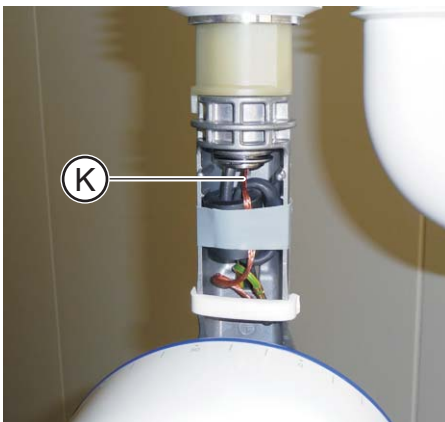
Perilous shock hazard!

Switch the line voltage off.

1. Switch the line voltage off at the main switch of the building installation.
2. Remove the power cable from connector **X200** on PC board DX1.

Visual check

1. Check the assembly and firm seating of the ground conductor.
2. Check the main fuse (F200, F201).
3. Check the condition of the grounding strap.
 - ✎ No damage should be evident at position **(K)**. A slight restriction at position **(K)** with a cross-section loss of max. 20% is still acceptable.



Protective ground wire test

Explanation

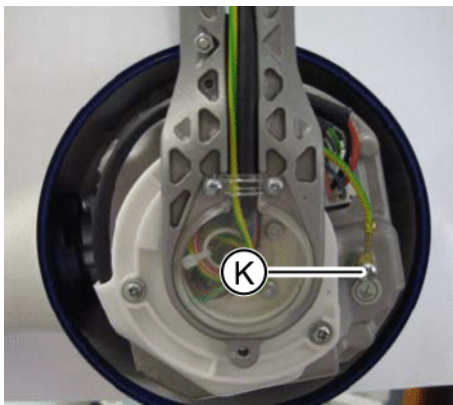
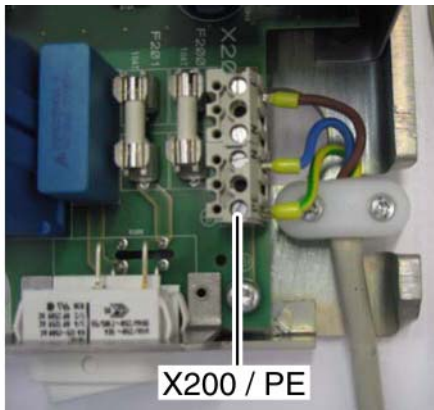
This test checks the electrical resistance of conductive and exposed parts of the X-ray unit against the protective wire connection.

Test assembly

See drawing.

Test

1. Set the test current for at least 5 seconds between protective wire connection **X200 / PE** (board DX1) and ground connection **B** (X-ray tube assembly).



2. Read the voltage drop on the voltmeter and the current on the ammeter.
3. Calculate the protective conductor resistance with the formula " $R = U / I$."

Limit value

The calculated resistance value must not be greater than 0.2 Ω .

8.1.3 Leakage current test

Auxiliary devices required

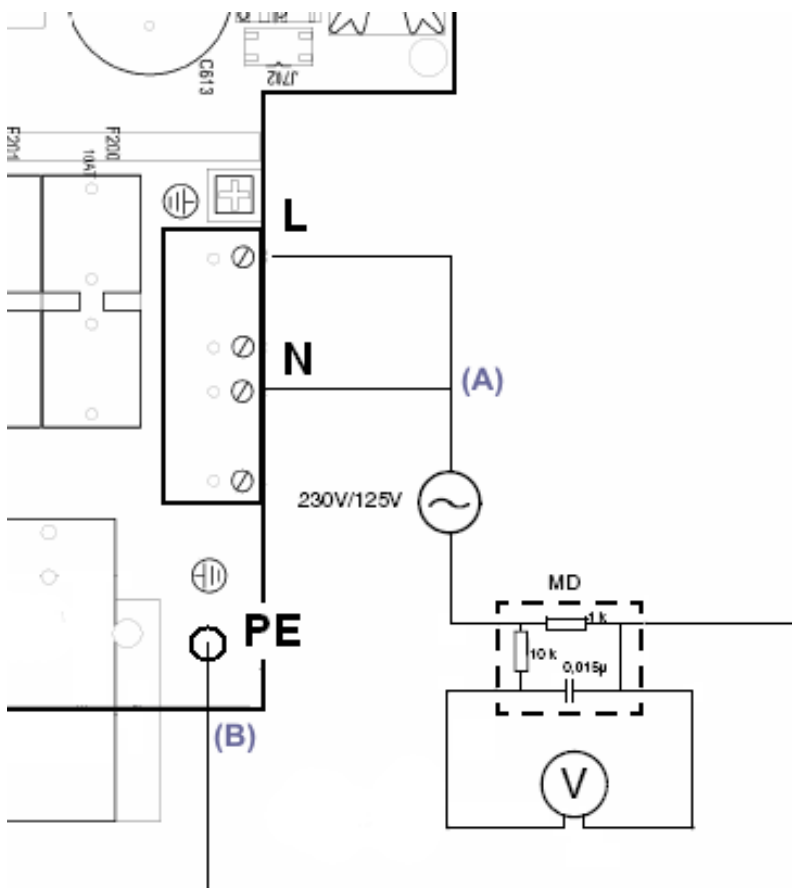
- Line-frequency, high-resistance measurement voltage source (isolation transformer)
- A measuring circuit (MD) that meets the requirements of IEC 60 601-1.
- Voltmeter

Alternative

Likewise, complete test devices, such as "Bender Tester" meet the requirements.

Equivalent device leakage current measurement

Test assembly



1. Connect the measurement voltage source to the measuring circuit (MD).
2. Connect the voltmeter to the measuring circuit (MD).
3. Connect the measuring circuit (MD) to the metal part (B) of the housing on the wall module.
4. Short-circuit the power connection (N and L) with a suitable cable.

5. Connect the measurement voltage source to the shorted power supply (A) .
6. Switch on the power supply of the unit.

Test



WARNING

Perilous shock hazard!

Do not touch the unit while measuring the leakage current!

1. Switch the measurement voltage source on.
2. Read the voltage drop at the voltmeter and adjust the measuring range if necessary.
3. Switch the measurement voltage source off.

Calculation

The measured value corresponds numerically to the leakage current.

Measuring range	Leakage current
mV	µA
V	mA

Wall model limit value

The measured value must not exceed **1mA**.

Ceiling model limit value

The measured value must not exceed **2.0 mA**.

Limit value with mobile stand

The measured value must not exceed **2.0 mA**.

NOTICE

Always document your measuring results for comparative measurements performed later.

- Enter the measured values in the maintenance certificate.
- Describe the measuring instrument used (to ensure reproducibility).

8.1.4 Checking the X-ray tube assembly

1. Switch on the building installation or the emergency circuit to which the HELIODENT^{PLUS} was connected.
2. Switch the unit on.
3. Monitor the self-test.
4. Select the shortest radiation time (0.01 - 0.05) and 60kV.

WARNING

X-ray radiation!

5. Release radiation 3 times.

8.1.5 Checking the tube current

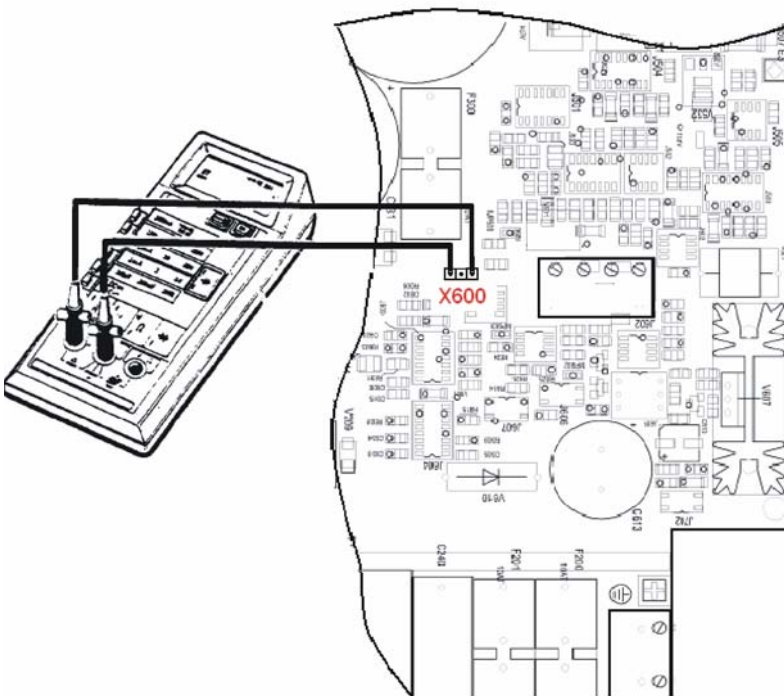
Auxiliary devices required

- Ammeter

CAUTION

Only use battery-powered measuring devices.

Preparation



1. Switch the unit off.
2. Set the ammeter to the "10 mA DC" measuring range.
3. Connect the ammeter to the two outer X600 connectors on board DX1.

4. Switch the unit on.
5. Set the radiation time to 3.2 seconds (display: "3.20 s").

test



WARNING

X-ray radiation!

- Release an exposure with the release button and read the tube current from the ammeter.

Tolerance: The tube current must be $7 \text{ mA} \pm 1.4 \text{ mA}$.

Completion

1. Switch the unit off.
2. Remove the measuring wires of the ammeter from connector **X600**.
3. Reattach the housing on the wall module.

In case of an error

- The measurement value is not reached.
 - Replace the X-ray tube assembly.

8.1.6 Checking exposure time and high voltage kV

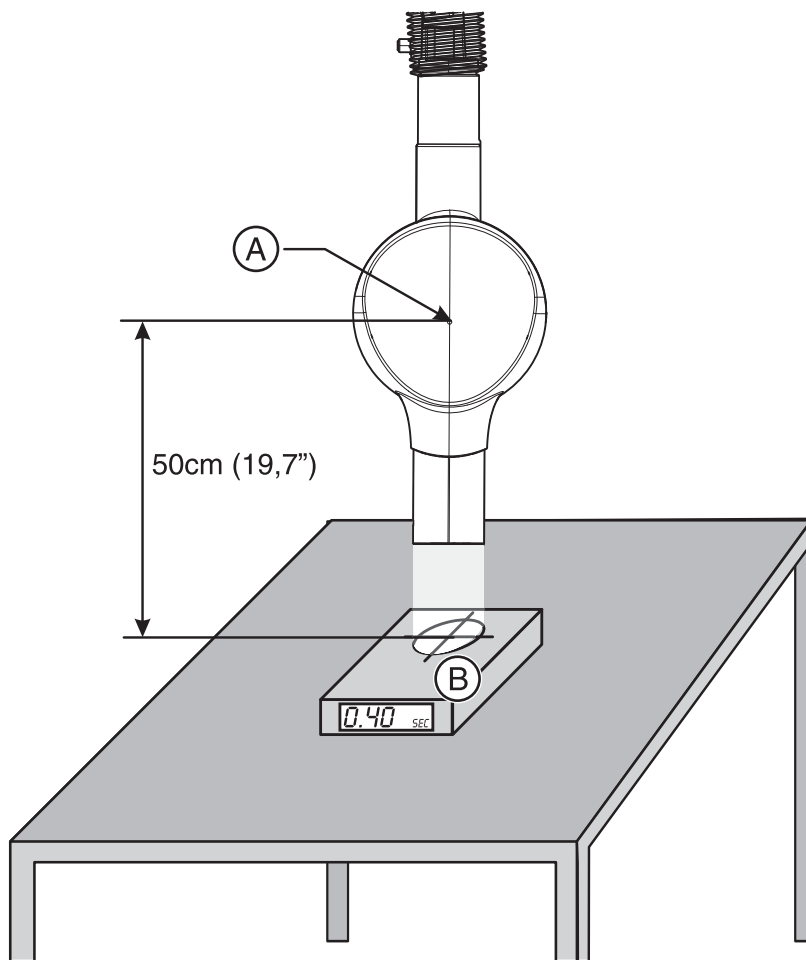
Auxiliary devices required

- Suitable radiation meter.

Examples:

- Mini-X
- PMX I-D
- MOM

Preparation



1. Switch the X-ray unit on.
2. Wait until the self-test is finished (operational readiness signal must be lit). The display reading shows the radiation time and a patient symbol).
3. Set an exposure time between 0.25 and 0.4 seconds. The display of control board DX4 must be clearly visible
4. Position the measuring instrument (B) in such a way that the active sensor measuring surface has a distance of 50 cm (19.7") from the focus (A) of the X-ray tube assembly.
5. Switch on the measuring instrument.

test



WARNING

X-ray radiation!

- Release an exposure with the release button.
 - The buzzer must be audible during radiation release.
 - The radiation indicator lights up.
 - The radiation LED lights up yellow.
 - The display background lights up yellow.
- Check the measures exposure time and the high voltage measured at the measuring instrument.

Tolerance: The permitted tolerance of the exposure time and high voltage is $\pm 10\%$.

In case of error

- Radiation time outside of tolerance limits
 - Replace board DX4.
- High voltage outside of tolerance limits
 - Replace DX1.

8.1.7 Checking the deadman function

test

1. Set the radiation time to 3.2 seconds (display: "3.20 s").



WARNING

X-ray radiation!

2. Release an exposure with the release button and let go of the release button prior to the end of the radiation.
 - ↪ The radiation must stop.
 - ↪ The actual radiation time must be shown as a **flashing** display.

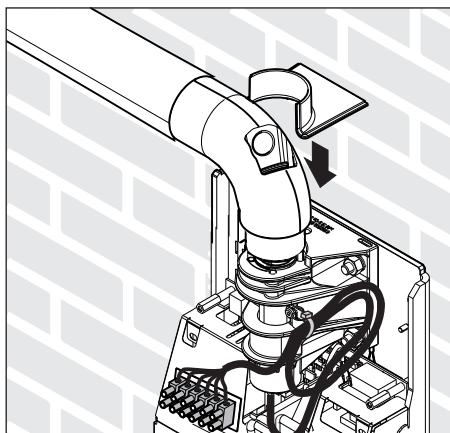
In case of an error

The unit does not stop releasing radiation.

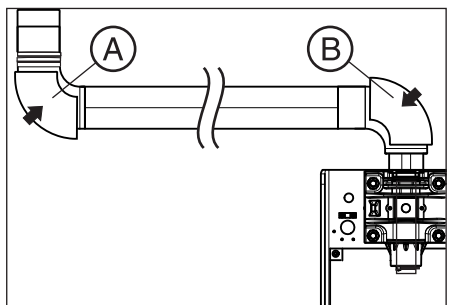
- Replace board DX4.

8.2 Attaching the housing covers

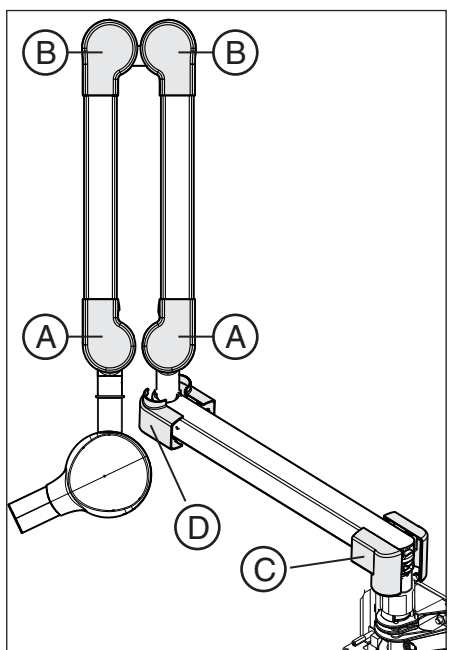
8.2.1 Support arm cover



1. In the case of round support arm system:
Set the cover of the arm connection onto the wall module as shown, between the support arm and the wall.

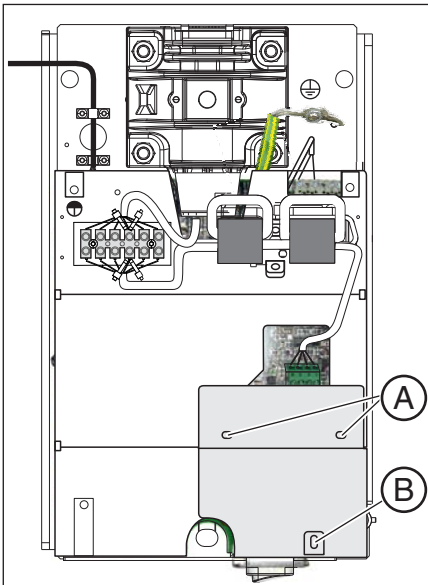


2. Attach the housing shells **A** and **B** to the support arm.



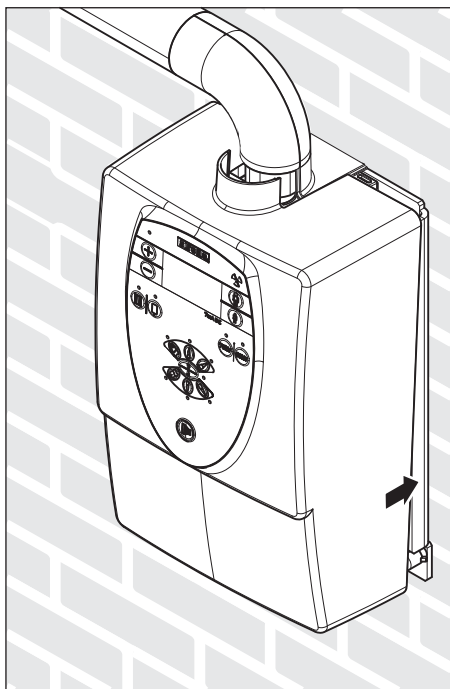
3. In the case of angular support arm system:
Attach the covers marked **A**, **B**, **C** and **D** to the support arm and scissor arm.

8.2.2 Attach the EMC additional plate for the wall adapter to the power supply

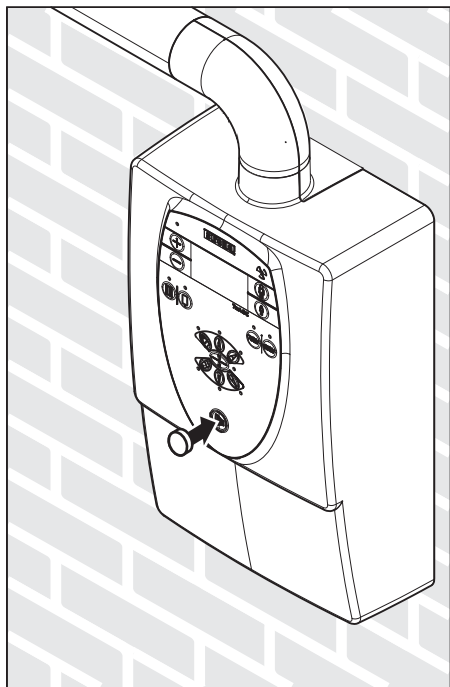


- ✓ The safety checks are performed, the power cable is connected.
- ✓ Not required for ceiling model.
- 1. Place the EMC additional plate on the EMC plate.
- 2. Screw the EMC additional plate on the EMC plate using 2 screws (A).
- 3. Screw the EMC additional plate onto the spacing bolt using screw (B).

8.2.3 Wall module

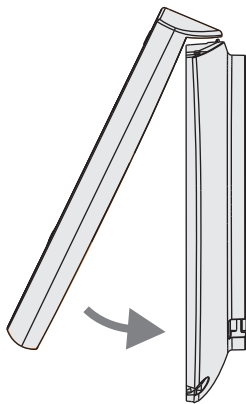
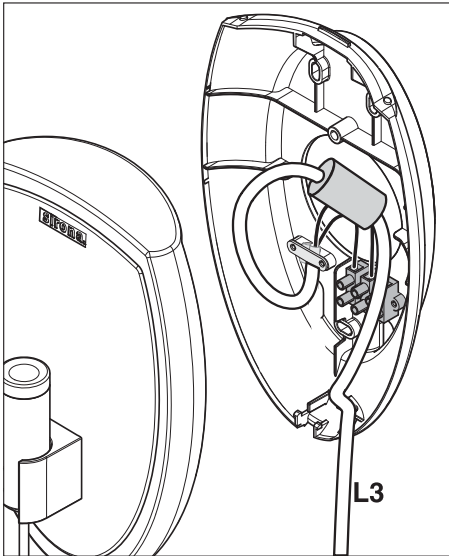


1. Attach the cover of the wall module, locking it into place at the top first.
2. Attach the cover with two screws from underneath.



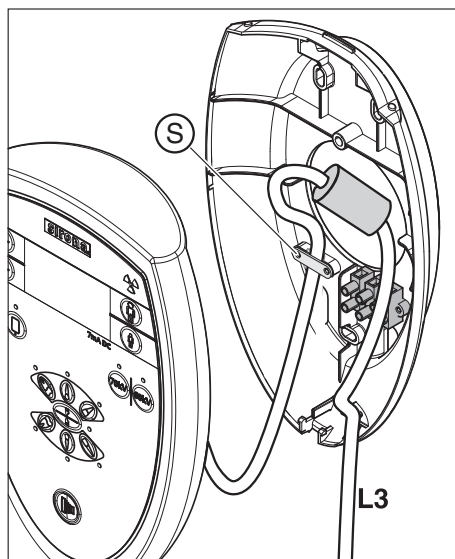
3. **Only with manual release S3 (coiled cable):** Cover the release symbol on the control membrane with the adhesive dot provided.

8.2.4 Remote control

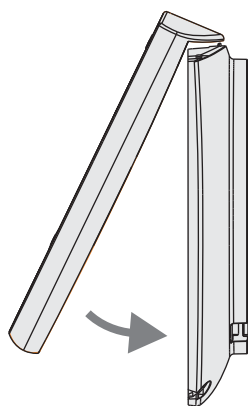


1. **Only with manual release S3 (coiled cable):** Place the ferrite core of the coiled cable inside the housing.
2. Mount the cover of the remote control on top of the chassis from above.
3. Snap the cover into the chassis at the bottom.
4. **Only with manual release S3 (coiled cable):** Connect the manual release.

8.2.5 Remote timer



1. **Only with manual release S3 (coiled cable):** Place the ferrite core of the coiled cable inside the housing centered on the opening in the wall. To do this, fasten the coiled cable with the strain relief clamp (S).



2. Mount the cover of the Remote Timer on top of the chassis from above.
3. Snap the cover into the chassis at the bottom.
4. **Only with manual release S3 (coiled cable):** Cover the release symbol on the control membrane with tape.
5. **Only with manual release S3 (coiled cable):** Hang the manual release into the holder next to the control membrane.

NOTICE

The blank panel must be firmly attached to the cover on the wall module.

8.3 Individual unit adaptation

Explanation

The functionality of the HELIODENT^{PLUS} can be adapted to customer requirements via service routines.

Command

See section "Service routines [→ 80]".

Overview

The following adaptation of the key assignment and the exposure tables are most often requested by the customer:

Service routine	Function
S05	Selection of sensor type
S04	Selection of film type
S06	Selection of cone type
S07	Set diaphragm type
S01	Configuration of transparency compensation for films
S02	Configuration of transparency compensation for sensors
S13	Activation/deactivation of 60/70 kV toggle
S14	Activation/deactivation of detector medium toggle (film/sensor)

Other service routines enable individual display settings:

Service routine	Function
S08	Configuration of radiation time and dose display after an X-ray exposure
S09	Configuration of time-out time of the radiation time and dose display
S10	Configuration of display options: Area dose and actual radiation time
S11	Configuration of power-save mode
S12	Configuration of time-out time of the power-save mode

More information on the service routines is provided in the Service Manual

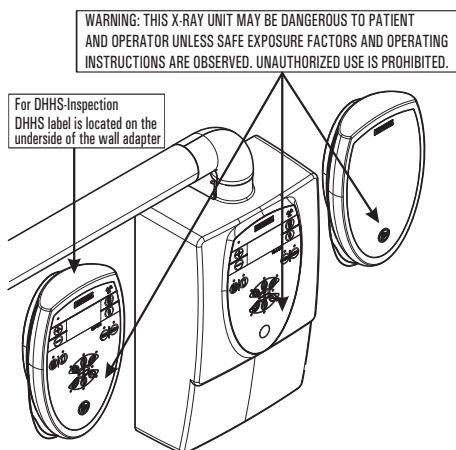
In addition, the user can activate preselected service routines via his own service area (see operating instructions).

9 Final work

1. Switch the unit on.
 2. Finally, check the functioning of the unit by releasing radiation repeatedly with different settings (time, kV, tooth symbol, patient symbol) according to the operating instructions. The unit must function flawlessly.
 3. Instruct the customer on how to operate the unit.
 4. Fill out the handover report together with the customer. Enter the serial numbers in the handover report.
- 👉 The unit is now ready for operation.

NOTICE

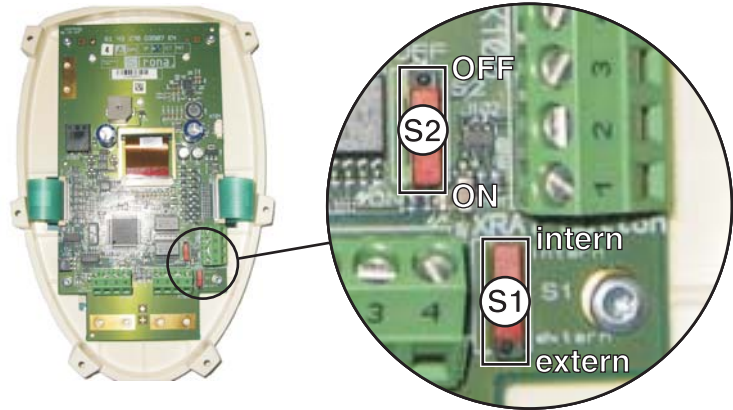
The technical documents included in the scope of supply are part of the system and must be handed over to the customer.



- **For the USA/Canada only:** Attach the warning label and the DHHS label.

10 Appendix

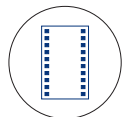
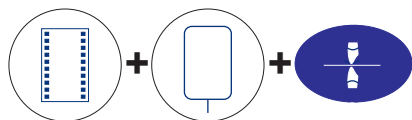
10.1 Selection of the release button



- Slide switch **S1** toggles between the release button on control membrane **S4** (*internal*) and an external release button (*external*). The external release button can be a manual release (**S3**) or a release button with remote control (**S9**).
- When delivered, slide switch **S1** is set to "*external*".

10.2 Service routines

10.2.1 Operation

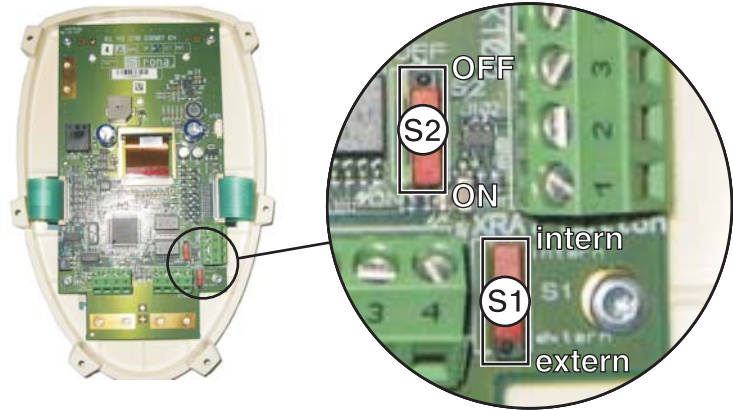


1. Switch the unit on.
2. Press the Film key, the Sensor key and the Bite Wing key simultaneously.
 - ↳ The service routine "S01" is displayed in front of a white background.
3. Scroll through the list of service routines by pressing the +/- keys.
4. Press the Film key to show the setting of the displayed service routine and make any changes which then may be necessary.
 - ↳ The setting is displayed.
5. To change the setting, press the +/- keys.
6. To save the current service routine, press the Adult key.
7. To discard the settings of the current service routine and quit it, press the Child key.
8. Finally, switch the unit off and then on again.

10.2.2 Service routine S15

Explanation

Configuration of the safety circuit bypass.



The safety circuit can be bypassed via hardware on DX4 (slide switch **S2**) (See section "Setting switch S1 and S2 on DX4 [→ 79]").

- Slide switch **S2** "On" = safety circuit bypassed
- Slide switch **S2** "Off" = safety circuit activated

If the setting of slide switch **S2** is changed, then the setting of service routine **S15** also must be changed.

- If slide switch **S2** is set to "On", then "On" also must be activated in service routine **S15**.
- If slide switch **S2** is set to "Off", then "Off" also must be activated in service routine **S15**.

Factory setting

- Slide switch **S2** and service routine 15 are set to "On" ex works.

Operation

Toggle between *Off* and *On* by pressing the +/- keys.

10.2.3 Adjustment following increased AL filter value

10.2.3.1 Adapting radiation times

- ✓ The radiation times must be adapted to the new total filtration.
- Call the S28 service routine and set the new total filtration so that the radiation times adjust automatically.

10.2.3.1.1 S28 service routine

Explanation

Setting the overall X-ray filter strength.

The overall X-ray filter strength is used as a parameter for calculating the target radiation time and the dose-area product.

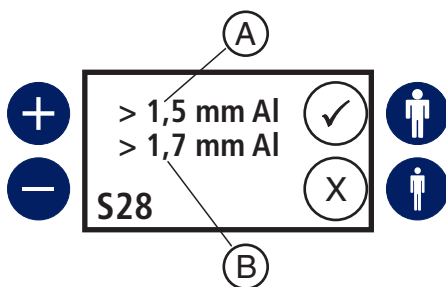
Operation

By pressing the +/- button, the filter setting can be amended between 1.5 mm AL and 2.5 mm AL in 0.1 mm steps.

A = Basic filter value
B = Changeable filter value

Acknowledge the setting by clicking the Adult key.

By pressing the Child key, the setting will be rejected and the service routine is exited.



Assigning the filter strength for the radiation time

Using the software, an offset is set for the radiation time according to the filter strength.

Total filtration [mm]	>1.5	>1.6	>1.7	>1.8	>1.9	>2.0	>2.1	>2.2	>2.3	>2.4	>2.5
Additional filter strength [mm]	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Radiation time level offset	0	0	0	+1	+1	+1	+1	+2	+2	+2	+2

10.3 Replacing old units

10.3.1 Overview

Explanation

It is possible to conceal the installation site of an old unit when installing a HELIODENT^{PLUS}.

- A special adapter plate is available for the purpose of replacing horizontally mounted old units (e.g. the HELIODENT DS)
 - See the section on "Replacement of horizontally mounted old units with an adapter plate [→ 83]".
- The HELIODENT^{PLUS} has a lower knock-out elongated hole for the replacement of vertically mounted old units.
 - See the section on "Replacement of vertically mounted old units [→ 86]".

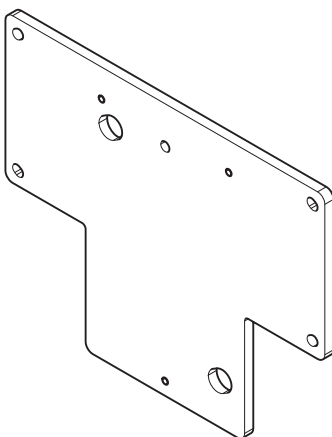
Prerequisites

- Regardless of their prior use, the existing drill holes and wall plugs must comply with the installation regulations and must be checked by the person performing installation.
- The different connection areas of the old units may make it necessary to relocate the existing electrical connections (e.g. concealed installation) on-site.

10.3.2 Replacement of horizontally mounted old units with an adapter plate

Explanation

The adapter plate (**REF 62 42 254**) serves to conceal an existing installation site of a horizontally mounted old unit and provide the threaded holes required to mount a HELIODENT^{PLUS}.



Suitable old units

- HELIODENT DS
- HELIODENT MD
- Planmeca Intra

CAUTION

The on-site electrical installation must be performed according to the valid regulations for medical electrical equipment (DIN VDE 0100-710).

CAUTION

Observe wall properties

In installation situations, the technician is responsible for the assessment of wall properties and selecting the method of attaching the unit to the wall.

Prerequisites

- A check was performed to ensure that the mounting dimensions of the old unit match those of the adapter plate.

NOTICE

Exclusion of liability if the adapter plate is modified

If any design/structural changes are made in the adapter plate (e.g. additional holes, removal of material, etc.) Sirona accepts no liability whatsoever for any damage caused by said changes.

Preparation

1. Unscrew and remove the old unit.
2. Check the existing drill holes. Do they comply with the description in the installation regulations?
3. Check the electrical connection area of the old unit. It may be necessary to relocate the electrical connections (concealed installation for example).
4. **Only if the old power cable is used:** Check whether the minimum requirement for the power cable ($3 \times 1.5 \text{ mm}^2$ (AWG 16)) has been fulfilled.
5. **Only for concealed installation of a remote control or a remote timer:** Check whether a conduit with a $\varnothing$ int. of at least 12mm (1/2") is available for cable **L6** or **L9**.

Concealed installation

CAUTION

Do not install the cables for Remote Timer **L6** and power cables in the same conduit.

1. **Only if the old power cable is used:** Extend the power cable sufficiently if necessary.
2. **Only if a remote timer is used:** Pull cable **L6** into the wall.
3. **Only if a remote control is used:** Pull cable **L9** into the wall.
4. Pick up the adapter plate.
5. Insert the power cable and any existing cables **L6** or **L9** through the adapter plate.
6. Screw on the adapter plate.
7. Align the adapter plate with a spirit level and screw it into place.
8. Attach the supplied caps to the screw heads.

Surface installation

1. Pick up the adapter plate.
2. Screw on the adapter plate.
3. Align the adapter plate with a spirit level and screw it into place.
4. Attach the supplied caps to the screw heads.

Further installation steps

- Perform the remaining installation steps as described in the Chapter on "Installation [→ 17]".

Adaptation of the remaining installation steps due to replacement of an old unit:

- The drilling template is not required.
- The wall adapter is fastened using the three M8x16 screws and three 8.4mm washers supplied.

10.3.3 Replacement of vertically mounted old units

Explanation

In the case of a vertically mounted old unit which was fastened with two installation holes located one above the other, a HELIODENT^{PLUS} can be installed using the existing drill holes.

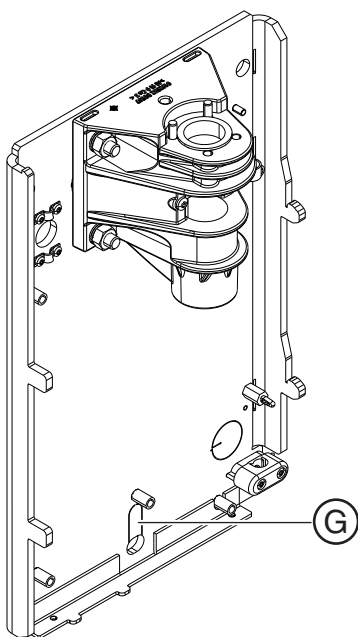
CAUTION

Observe wall properties

In installation situations, the technician is responsible for the assessment of wall properties and selecting the method of attaching the unit to the wall.

Prerequisites

- The existing distance between the drill holes must be between 258 (10 1/8") and 281 mm (11").
 - **"Elongated hole" installation version:** If the distance between the drill holes is less than 281 mm (11"), the lower knock-out elongated hole (G) of the wall adapter must be used.



Suitable old units

- Progeny Preva
- Gendex 765DC¹

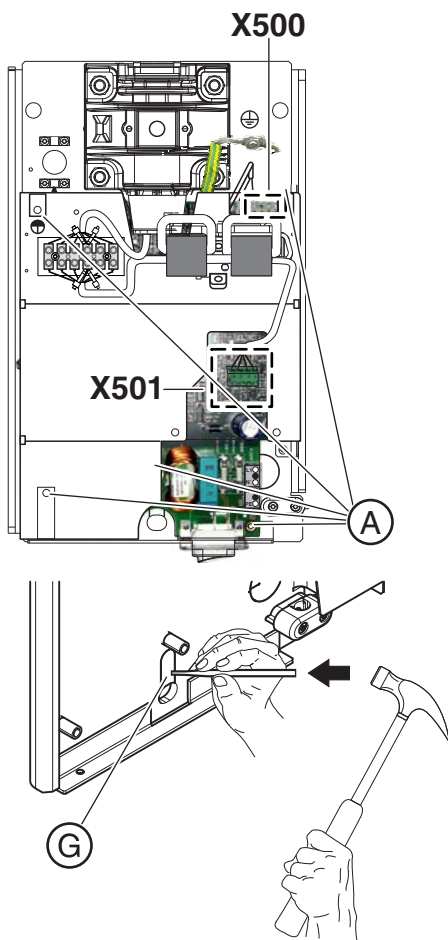
Preparation

1. Unscrew and remove the old unit.
2. Check the existing drill holes. Do they comply with the description in the installation regulations?
3. Check the electrical connection area of the old unit. It may be necessary to relocate the electrical connections (concealed installation for example).
4. **Only if the old power cable is used:** Check whether the minimum requirement for the power cable ($3 \times 1.5 \text{ mm}^2$ (AWG 16)) has been fulfilled.
5. **Only for concealed installation of a remote control or a remote timer:** Check whether a conduit with a $\varnothing$ int. of at least 12mm (1/2") is available for cable **L6** or **L9**.

CAUTION

Risk of damage

Make sure that board DX1 is not damaged when dismantling it!
Observe ESD protective measures!



6. **"Elongated hole" installation version only:** Unscrew the cables from board DX1 on terminal strips X500 and X501.
7. **"Elongated hole" installation version only:** Remove fastening screws **A** from the board DX1 with the EMC plate (5x) and take board DX1 off the wall adapter.
8. **"Elongated hole" installation version only:** Carefully punch out opening (G) in the wall adapter with a punch.

Concealed installation

CAUTION

Do not install the cables for Remote Timer **L6** and power cables in the same conduit.

1. **Only if the old power cable is used:** Extend the power cable sufficiently if necessary.
2. **Only if a remote timer is used:** Pull cable **L6** into the wall.
3. **Only if a remote control is used:** Pull cable **L9** into the wall.

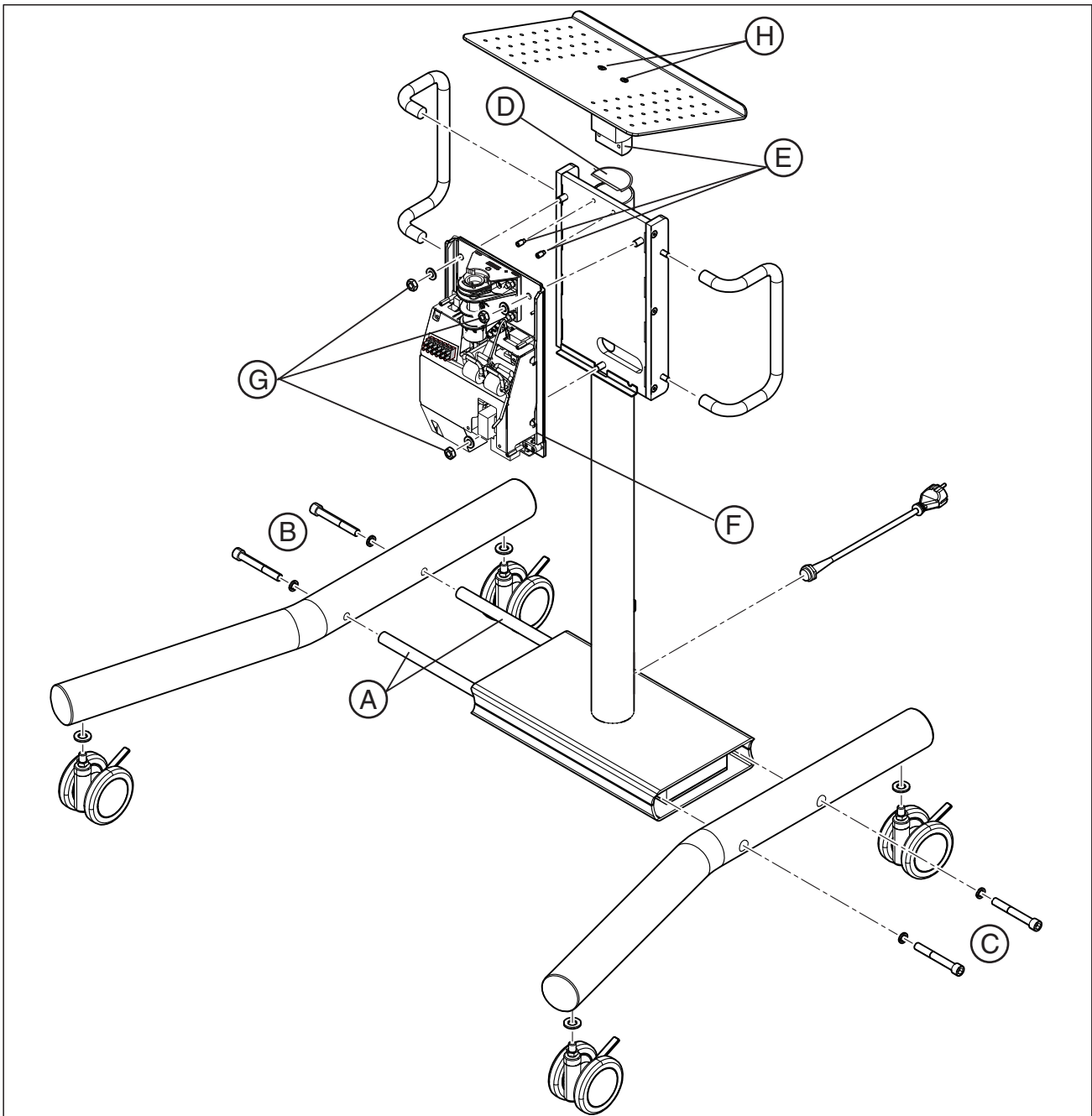
Further installation steps

- Perform the remaining installation steps as described in the Chapter on "Installation [→ 17]".

Adaptation of the remaining installation steps due to replacement of an old unit:

- **"Elongated hole" installation version only:** Once you have screwed on the wall adapter, screw board DX1 back on again and reconnect the cables to terminal strips **X500** and **X501**.
 - Terminal block **X500**:
 - X500.1 : blue (V)
 - X500.2: pink (W)
 - Terminal block **X501**:
 - X501.1 : gray/brown (negative)
 - X501.2 : white (heating-)
 - X501.3 : yellow (heating+)
 - X501.4 : green (kVact)

10.4 Installing the mobile stand



- ✓ Unpack the parts for the mobile stand
- 1. Screw the two rods (A) to the foot (B) using two screws and spring washers.
- 2. Insert the rods through the square tube and screw down the foot (C) using two screws and spring washers.
- 3. With the optional tray:
 - Remove the cover cap (D).
 - Insert the tray (E) and screw it in place using 2 screws.
 - Unscrew the tray (H), 2 Allen wrench 4 mm.

4. Pull the power cable through the larger hole (F) in the wall adapter.
5. Attach the wall adapter to the threaded studs and screw the three nuts (G) (M8) onto the threaded studs with a washer. Align the wall adapter using a spirit level and tighten the three nuts (recommended torque: 25 Nm).
6. Perform the additional installation steps from Installing the support arm and scissor arm onwards.
7. Once the support arm is installed, screw the tray (H) in place again.

 CAUTION

The wall adapter mounted on the mobile stand must have a serial number higher than **22 001**.
Only a support arm with a length of 410 mm may be mounted on the mobile stand.

We reserve the right to make any alterations which may be required due to technical improvements.

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